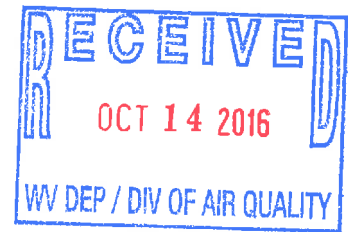


1000 Noble Energy Drive
Canonsburg, PA 15317
Tel: 724-820-3000
Fax: 724-820-3098
www.nobleenergyinc.com



October 6, 2016

Ms. Beverly McKeone
NSR Permitting Program Manager
West Virginia Department of Environmental Protection
Division of Air Quality
601 57th Street, SE
Charleston, WV 25304

RE: Noble Energy, Inc
SHL 22
45CSR13 Permit Application
Marshall County, West Virginia

Dear Ms. McKeone:

Noble Energy, Inc respectfully submits this Air Quality Permit Application for the above referenced facility pursuant to 45CSR13. We look forward to working towards a timely review and issuance of the requested approval.

This application is for the construction and operation of a Marcellus Natural Gas Production Facility located in Marshall County, West Virginia. While condensate and natural gas will be produced directly to pipeline, the proposed design includes control devices for the produced water tanks and loadout as well as a flare for controlling the maintenance / well unloading vessel.

Please find the enclosed information for all associated process equipment and control devices.

Please note that the newspaper notification will be published and the original affidavit will be remitted to the Department promptly upon receipt.

Noble Energy will also be contacting the WVDEP to pay the application fee by credit card. Should you have any questions or require further information the application package, please do not hesitate to contact me (Phil.Schlagel@nblenergy.com, 281-872-3202).

We thank you in advance for your efforts in reviewing this submittal.

Sincerely,

A handwritten signature in black ink, appearing to read 'Phil Schlagel', written over the word 'Sincerely,'.

Phil Schlagel
Air Quality Manager
Noble Energy, Inc

Enclosures:

Noble Energy, Inc

45CSR13 Permit Application
SHL 22 Production Facility

Marshall County, West Virginia

October 2016



WEST VIRGINIA DEPARTMENT OF
ENVIRONMENTAL PROTECTION
DIVISION OF AIR QUALITY

601 57th Street, SE
Charleston, WV 25304
(304) 926-0475
www.dep.wv.gov/daq

**APPLICATION FOR NSR PERMIT
AND
TITLE V PERMIT REVISION
(OPTIONAL)**

PLEASE CHECK ALL THAT APPLY TO NSR (45CSR13) (IF KNOWN):

- ☒ CONSTRUCTION ☐ MODIFICATION ☐ RELOCATION
☐ CLASS I ADMINISTRATIVE UPDATE ☐ TEMPORARY
☐ CLASS II ADMINISTRATIVE UPDATE ☐ AFTER-THE-FACT

PLEASE CHECK TYPE OF 45CSR30 (TITLE V) REVISION (IF ANY):

- ☐ ADMINISTRATIVE AMENDMENT ☐ MINOR MODIFICATION
☐ SIGNIFICANT MODIFICATION

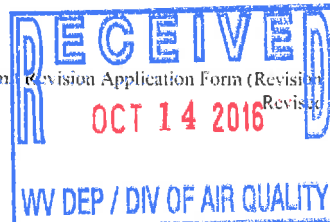
IF ANY BOX ABOVE IS CHECKED, INCLUDE TITLE V REVISION
INFORMATION AS ATTACHMENT S TO THIS APPLICATION

FOR TITLE V FACILITIES ONLY: Please refer to "Title V Revision Guidance" in order to determine your Title V Revision options
(Appendix A, "Title V Permit Revision Flowchart") and ability to operate with the changes requested in this Permit Application.

Section I. General

1. Name of applicant (as registered with the WV Secretary of State's Office): Noble Energy, Inc.		2. Federal Employer ID No. (FEIN): 73-0785597	
3. Name of facility (if different from above): Sand Hill 22 (SHL 22)		4. The applicant is the: <input type="checkbox"/> OWNER <input checked="" type="checkbox"/> OPERATOR <input type="checkbox"/> BOTH	
5A. Applicant's mailing address: 1000 Noble Energy Drive Canonsburg, PA 15317		5B. Facility's present physical address: 100 Standford Rd Wheeling, WV	
6. West Virginia Business Registration. Is the applicant a resident of the State of West Virginia? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO If YES, provide a copy of the Certificate of Incorporation/Organization/Limited Partnership (one page) including any name change amendments or other Business Registration Certificate as Attachment A . If NO, provide a copy of the Certificate of Authority/Authority of L.L.C./Registration (one page) including any name change amendments or other Business Certificate as Attachment A .			
7. If applicant is a subsidiary corporation, please provide the name of parent corporation:			
8. Does the applicant own, lease, have an option to buy or otherwise have control of the proposed site? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO If YES, please explain: Noble Energy, Inc. operates the Sand Hill 22 production facility under lease. If NO, you are not eligible for a permit for this source.			
9. Type of plant or facility (stationary source) to be constructed, modified, relocated, administratively updated or temporarily permitted (e.g., coal preparation plant, primary crusher, etc.): Oil and Natural Gas Production Facility		10. North American Industry Classification System (NAICS) code for the facility: 211111	
11A. DAQ Plant ID No. (for existing facilities only): -		11B. List all current 45CSR13 and 45CSR30 (Title V) permit numbers associated with this process (for existing facilities only): NA	

All of the required forms and additional information can be found under the Permitting Section of DAQ's website, or requested by phone.



<p>12A.</p> <p>☛ For Modifications, Administrative Updates or Temporary permits at an existing facility, please provide directions to the <i>present location</i> of the facility from the nearest state road;</p> <p>☛ For Construction or Relocation permits, please provide directions to the <i>proposed new site location</i> from the nearest state road. Include a MAP as Attachment B.</p> <p>From Interstate 70, take Dallas Pike Road Exit (Exit 11), at bottom of ramp, make a right if traveling east or left if traveling west onto CR 41 (Dallas Pike Road), and travel Dallas Pike Road approximately 4.9 miles to the town of Dallas, make a right onto CR 7 (Stone Church/Sand Hill Road), make a right onto Stone Church/Sand Hill Road and travel approximately 1.8 miles to CR 7 (Wye Intersection) – Sand Hill Road, make a left hand turn onto Sand Hill Road and travel approximately 1.1 miles to CR 9 - Standiford Hill Road, make a right turn onto Standiford Hill Road and travel 0.1 mile to lease road on left.</p>		
<p>12.B. New site address (if applicable):</p>	<p>12C. Nearest city or town: Dallas, WV</p>	<p>12D. County: Marshall</p>
<p>12.E. UTM Northing (KM): 4429.0509</p>	<p>12F. UTM Easting (KM): 536.136</p>	<p>12G. UTM Zone: 17N</p>
<p>13. Briefly describe the proposed change(s) at the facility: New construction of oil and natural gas production facility</p>		
<p>14A. Provide the date of anticipated installation or change: 01 / 01 / 2017 ☛ If this is an After-The-Fact permit application, provide the date upon which the proposed change did happen: / /</p>		<p>14B. Date of anticipated Start-Up if a permit is granted: 02 / 17 / 2017</p>
<p>14C. Provide a Schedule of the planned Installation of/Change to and Start-Up of each of the units proposed in this permit application as Attachment C (if more than one unit is involved).</p>		
<p>15. Provide maximum projected Operating Schedule of activity/activities outlined in this application: Hours Per Day 24 Days Per Week 7 Weeks Per Year 52</p>		
<p>16. Is demolition or physical renovation at an existing facility involved? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO</p>		
<p>17. Risk Management Plans. If this facility is subject to 112(r) of the 1990 CAAA, or will become subject due to proposed changes (for applicability help see www.epa.gov/ceppo), submit your Risk Management Plan (RMP) to U. S. EPA Region III.</p>		
<p>18. Regulatory Discussion. List all Federal and State air pollution control regulations that you believe are applicable to the proposed process (<i>if known</i>). A list of possible applicable requirements is also included in Attachment S of this application (Title V Permit Revision Information). Discuss applicability and proposed demonstration(s) of compliance (<i>if known</i>). Provide this information as Attachment D.</p>		
<p>Section II. Additional attachments and supporting documents.</p>		
<p>19. Include a check payable to WVDEP – Division of Air Quality with the appropriate application fee (per 45CSR22 and 45CSR13).</p>		
<p>20. Include a Table of Contents as the first page of your application package.</p>		
<p>21. Provide a Plot Plan, e.g. scaled map(s) and/or sketch(es) showing the location of the property on which the stationary source(s) is or is to be located as Attachment E (Refer to Plot Plan Guidance). ☛ Indicate the location of the nearest occupied structure (e.g. church, school, business, residence).</p>		
<p>22. Provide a Detailed Process Flow Diagram(s) showing each proposed or modified emissions unit, emission point and control device as Attachment F.</p>		
<p>23. Provide a Process Description as Attachment G. ☛ Also describe and quantify to the extent possible all changes made to the facility since the last permit review (if applicable).</p>		
<p><i>All of the required forms and additional information can be found under the Permitting Section of DAQ's website, or requested by phone.</i></p>		

24. Provide Material Safety Data Sheets (MSDS) for all materials processed, used or produced as Attachment H . For chemical processes, provide a MSDS for each compound emitted to the air.																	
25. Fill out the Emission Units Table and provide it as Attachment I .																	
26. Fill out the Emission Points Data Summary Sheet (Table 1 and Table 2) and provide it as Attachment J .																	
27. Fill out the Fugitive Emissions Data Summary Sheet and provide it as Attachment K .																	
28. Check all applicable Emissions Unit Data Sheets listed below: <table style="width: 100%; border: none;"> <tr> <td><input checked="" type="checkbox"/> Bulk Liquid Transfer Operations</td> <td><input type="checkbox"/> Haul Road Emissions</td> <td><input type="checkbox"/> Quarry</td> </tr> <tr> <td><input type="checkbox"/> Chemical Processes</td> <td><input type="checkbox"/> Hot Mix Asphalt Plant</td> <td><input type="checkbox"/> Solid Materials Sizing, Handling and Storage Facilities</td> </tr> <tr> <td><input type="checkbox"/> Concrete Batch Plant</td> <td><input checked="" type="checkbox"/> Incinerator</td> <td><input checked="" type="checkbox"/> Storage Tanks</td> </tr> <tr> <td><input type="checkbox"/> Grey Iron and Steel Foundry</td> <td><input type="checkbox"/> Indirect Heat Exchanger</td> <td></td> </tr> <tr> <td colspan="3"> <input checked="" type="checkbox"/> General Emission Unit, specify Pneumatic Controllers, Fuel Cell Generator, Diaphragm Pump </td> </tr> </table>			<input checked="" type="checkbox"/> Bulk Liquid Transfer Operations	<input type="checkbox"/> Haul Road Emissions	<input type="checkbox"/> Quarry	<input type="checkbox"/> Chemical Processes	<input type="checkbox"/> Hot Mix Asphalt Plant	<input type="checkbox"/> Solid Materials Sizing, Handling and Storage Facilities	<input type="checkbox"/> Concrete Batch Plant	<input checked="" type="checkbox"/> Incinerator	<input checked="" type="checkbox"/> Storage Tanks	<input type="checkbox"/> Grey Iron and Steel Foundry	<input type="checkbox"/> Indirect Heat Exchanger		<input checked="" type="checkbox"/> General Emission Unit, specify Pneumatic Controllers, Fuel Cell Generator, Diaphragm Pump		
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Fill out and provide the Emissions Unit Data Sheet(s) as Attachment L .																	
29. Check all applicable Air Pollution Control Device Sheets listed below: <table style="width: 100%; border: none;"> <tr> <td><input type="checkbox"/> Absorption Systems</td> <td><input type="checkbox"/> Baghouse</td> <td><input checked="" type="checkbox"/> Flare</td> </tr> <tr> <td><input type="checkbox"/> Adsorption Systems</td> <td><input type="checkbox"/> Condenser</td> <td><input type="checkbox"/> Mechanical Collector</td> </tr> <tr> <td><input type="checkbox"/> Afterburner</td> <td><input type="checkbox"/> Electrostatic Precipitator</td> <td><input type="checkbox"/> Wet Collecting System</td> </tr> <tr> <td colspan="3"> <input checked="" type="checkbox"/> Other Collectors, specify NSCR </td> </tr> </table>			<input type="checkbox"/> Absorption Systems	<input type="checkbox"/> Baghouse	<input checked="" type="checkbox"/> Flare	<input type="checkbox"/> Adsorption Systems	<input type="checkbox"/> Condenser	<input type="checkbox"/> Mechanical Collector	<input type="checkbox"/> Afterburner	<input type="checkbox"/> Electrostatic Precipitator	<input type="checkbox"/> Wet Collecting System	<input checked="" type="checkbox"/> Other Collectors, specify NSCR					
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<input checked="" type="checkbox"/> Other Collectors, specify NSCR																	
Fill out and provide the Air Pollution Control Device Sheet(s) as Attachment M .																	
30. Provide all Supporting Emissions Calculations as Attachment N , or attach the calculations directly to the forms listed in Items 28 through 31.																	
31. Monitoring, Recordkeeping, Reporting and Testing Plans. Attach proposed monitoring, recordkeeping, reporting and testing plans in order to demonstrate compliance with the proposed emissions limits and operating parameters in this permit application. Provide this information as Attachment O . ➤ Please be aware that all permits must be practically enforceable whether or not the applicant chooses to propose such measures. Additionally, the DAQ may not be able to accept all measures proposed by the applicant. If none of these plans are proposed by the applicant, DAQ will develop such plans and include them in the permit.																	
32. Public Notice. At the time that the application is submitted, place a Class I Legal Advertisement in a newspaper of general circulation in the area where the source is or will be located (See 45CSR§13-8.3 through 45CSR§13-8.5 and Example Legal Advertisement for details). Please submit the Affidavit of Publication as Attachment P immediately upon receipt.																	
33. Business Confidentiality Claims. Does this application include confidential information (per 45CSR31)? <div style="text-align: center;"> <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO </div> ➤ If YES, identify each segment of information on each page that is submitted as confidential and provide justification for each segment claimed confidential, including the criteria under 45CSR§31-4.1, and in accordance with the DAQ's " Precautionary Notice – Claims of Confidentiality " guidance found in the General Instructions as Attachment Q .																	

Section III. Certification of Information

34. Authority/Delegation of Authority. Only required when someone other than the responsible official signs the application. Check applicable Authority Form below: <table style="width: 100%; border: none;"> <tr> <td><input type="checkbox"/> Authority of Corporation or Other Business Entity</td> <td><input type="checkbox"/> Authority of Partnership</td> </tr> <tr> <td><input type="checkbox"/> Authority of Governmental Agency</td> <td><input type="checkbox"/> Authority of Limited Partnership</td> </tr> </table>		<input type="checkbox"/> Authority of Corporation or Other Business Entity	<input type="checkbox"/> Authority of Partnership	<input type="checkbox"/> Authority of Governmental Agency	<input type="checkbox"/> Authority of Limited Partnership
<input type="checkbox"/> Authority of Corporation or Other Business Entity	<input type="checkbox"/> Authority of Partnership				
<input type="checkbox"/> Authority of Governmental Agency	<input type="checkbox"/> Authority of Limited Partnership				
Submit completed and signed Authority Form as Attachment R .					
<i>All of the required forms and additional information can be found under the Permitting Section of DAQ's website, or requested by phone.</i>					

35A. **Certification of Information.** To certify this permit application, a Responsible Official (per 45CSR§13-2.22 and 45CSR§30-2.28) or Authorized Representative shall check the appropriate box and sign below.

Certification of Truth, Accuracy, and Completeness

I, the undersigned ☒ **Responsible Official** / ☐ **Authorized Representative**, hereby certify that all information contained in this application and any supporting documents appended hereto, is true, accurate, and complete based on information and belief after reasonable inquiry I further agree to assume responsibility for the construction, modification and/or relocation and operation of the stationary source described herein in accordance with this application and any amendments thereto, as well as the Department of Environmental Protection, Division of Air Quality permit issued in accordance with this application, along with all applicable rules and regulations of the West Virginia Division of Air Quality and W.Va. Code § 22-5-1 et seq. (State Air Pollution Control Act). If the business or agency changes its Responsible Official or Authorized Representative, the Director of the Division of Air Quality will be notified in writing within 30 days of the official change.

Compliance Certification

Except for requirements identified in the Title V Application for which compliance is not achieved, I, the undersigned hereby certify that, based on information and belief formed after reasonable inquiry, all air contaminant sources identified in this application are in compliance with all applicable requirements.

SIGNATURE _____

(Please use blue ink)

DATE: _____

(Please use blue ink)

35B. Printed name of signee:

RJ Moses

35C. Title:

Operations Manager

35D. E-mail:

rj.moses@nbenergy.com

36E. Phone:

724-820-3000

36F. FAX:

724-820-3098

36A. Printed name of contact person (if different from above):

Phil Schlagel

36B. Title:

Air Quality Manager

36C. E-mail:

phil.schlagel@nbenergy.com

36D. Phone:

281-872-3202

36E. FAX:

PLEASE CHECK ALL APPLICABLE ATTACHMENTS INCLUDED WITH THIS PERMIT APPLICATION:

- | | |
|--|---|
| <input checked="" type="checkbox"/> Attachment A: Business Certificate | <input checked="" type="checkbox"/> Attachment K: Fugitive Emissions Data Summary Sheet |
| <input checked="" type="checkbox"/> Attachment B: Map(s) | <input checked="" type="checkbox"/> Attachment L: Emissions Unit Data Sheet(s) |
| <input type="checkbox"/> Attachment C: Installation and Start Up Schedule | <input checked="" type="checkbox"/> Attachment M: Air Pollution Control Device Sheet(s) |
| <input checked="" type="checkbox"/> Attachment D: Regulatory Discussion | <input checked="" type="checkbox"/> Attachment N: Supporting Emissions Calculations |
| <input checked="" type="checkbox"/> Attachment E: Plot Plan | <input type="checkbox"/> Attachment O: Monitoring/Recordkeeping/Reporting/Testing Plans |
| <input checked="" type="checkbox"/> Attachment F: Detailed Process Flow Diagram(s) | <input checked="" type="checkbox"/> Attachment P: Public Notice |
| <input checked="" type="checkbox"/> Attachment G: Process Description | <input type="checkbox"/> Attachment Q: Business Confidential Claims |
| <input type="checkbox"/> Attachment H: Material Safety Data Sheets (MSDS) | <input type="checkbox"/> Attachment R: Authority Forms |
| <input checked="" type="checkbox"/> Attachment I: Emission Units Table | <input type="checkbox"/> Attachment S: Title V Permit Revision Information |
| <input checked="" type="checkbox"/> Attachment J: Emission Points Data Summary Sheet | <input checked="" type="checkbox"/> Application Fee |

Please mail an original and three (3) copies of the complete permit application with the signature(s) to the DAQ, Permitting Section, at the address listed on the first page of this application. Please DO NOT fax permit applications.

FOR AGENCY USE ONLY – IF THIS IS A TITLE V SOURCE:

- ☐ Forward 1 copy of the application to the Title V Permitting Group and:
- ☐ For Title V Administrative Amendments:
- ☐ NSR permit writer should notify Title V permit writer of draft permit,
- ☐ For Title V Minor Modifications:
- ☐ Title V permit writer should send appropriate notification to EPA and affected states within 5 days of receipt,
- ☐ NSR permit writer should notify Title V permit writer of draft permit.
- ☐ For Title V Significant Modifications processed in parallel with NSR Permit revision:
- ☐ NSR permit writer should notify a Title V permit writer of draft permit,
- ☐ Public notice should reference both 45CSR13 and Title V permits,
- ☐ EPA has 45 day review period of a draft permit.

All of the required forms and additional information can be found under the Permitting Section of DAQ's website, or requested by phone.

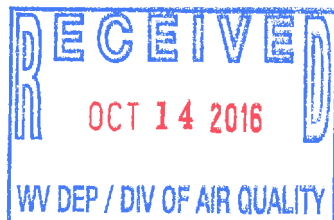


TABLE OF CONTENTS

Attachments:

A - Current Business Certificate

B - Area Map

D - Regulatory Discussion

E - Plot Plan

F - Process Flow Diagram

G - Process Description

I - Emission Units Table

J - Emission Points Data Summary Sheet

K - Fugitive Emissions Data

L - Emission Unit Data Sheets

M - Air Pollution Control Device Sheets

N - Supporting Emissions Calculations & Documents

P - Public Notice

Noble Energy, Inc. SHL 22 Production Facility

Permit Application Fee

As stated in the cover letter, please contact Phil Schlagel (Phil.Schlagel@nbleenergy.com, 281-872-3202) for payment.

Noble Energy, Inc. SHL 22 Production Facility

ATTACHMENT A

Noble Energy, Inc.

Certificate of Authority for West Virginia

State of West Virginia



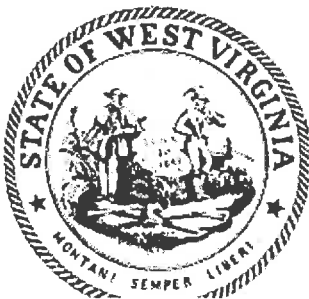
Certificate

*I, Natalie E. Tennant, Secretary of State of the
State of West Virginia, hereby certify that*

by the provisions of the West Virginia Code, Articles of Merger were received and filed,
MERGING NOBLE ENERGY MARKETING, INC., A QUALIFIED DE ORGANIZATION, WITH AND INTO NOBLE ENERGY,
INC., A QUALIFIED DE ORGANIZATION.

Therefore, I hereby issue this

CERTIFICATE OF MERGER



*Given under my hand and the
Great Seal of the State of
West Virginia on this day of
December 15, 2010*

Natalie E. Tennant
Secretary of State

State of Delaware
Secretary of State
Division of Corporations
Delivered 06:59 PM 12/17/2009
FILED 06:59 PM 12/17/2009
SRV 091114165 - 0738126 FILE

**CERTIFICATE OF MERGER
OF
NOBLE ENERGY MARKETING, INC.
(a Delaware corporation)
WITH AND INTO
NOBLE ENERGY, INC.
(a Delaware corporation)**

Pursuant to Title 8, Section 251(c) of the Delaware General Corporation Law, the undersigned corporation hereby certifies the following:

1. The name of the surviving corporation is Noble Energy, Inc., a Delaware corporation, and the name of the corporation being merged into the surviving corporation is Noble Energy Marketing, Inc., a Delaware corporation.
2. The Agreement of Merger has been approved, adopted, certified, executed, and acknowledged by each of the constituent corporations.
3. The name of the surviving corporation is Noble Energy, Inc., a Delaware corporation.
4. The Certificate of Incorporation of Noble Energy, Inc. shall be the Certificate of Incorporation of the surviving corporation.
5. The merger is to become effective at 11:59 p.m. Eastern time on December 31, 2009.
6. A copy of the Agreement of Merger is on file at the place of business of Noble Energy, Inc., which is located at 100 Glenborough Drive, Suite 100, Houston, Texas 77067.
7. Upon request, a copy of the Agreement of Merger will be furnished by Noble Energy, Inc., without cost, to any stockholder of the constituent corporations.

IN WITNESS WHEREOF, the undersigned has caused this Certificate of Merger to be executed by its duly authorized officer as of the 16th day of December, 2009.

NOBLE ENERGY, INC.

By: /s/ David L. Stover
Name: David L. Stover
Title: Vice President

Delaware

The First State

PAGE 1

I, JEFFREY W. BULLOCK, SECRETARY OF STATE OF THE STATE OF DELAWARE, DO HEREBY CERTIFY THE ATTACHED IS A TRUE AND CORRECT COPY OF THE CERTIFICATE OF MERGER, WHICH MERGES:

"NOBLE ENERGY MARKETING, INC.", A DELAWARE CORPORATION, WITH AND INTO "NOBLE ENERGY, INC." UNDER THE NAME OF "NOBLE ENERGY, INC.", A CORPORATION ORGANIZED AND EXISTING UNDER THE LAWS OF THE STATE OF DELAWARE, AS RECEIVED AND FILED IN THIS OFFICE THE SEVENTEENTH DAY OF DECEMBER, A.D. 2009, AT 6:59 O'CLOCK P.M.

AND I DO HEREBY FURTHER CERTIFY THAT THE EFFECTIVE DATE OF THE AFORESAID CERTIFICATE OF MERGER IS THE THIRTY-FIRST DAY OF DECEMBER, A.D. 2009, AT 11:59 O'CLOCK P.M.

FILED

DEC 15 2010

IN THE OFFICE OF
SECRETARY OF STATE



0738126 8100M

101192174

You may verify this certificate online
at corp.delaware.gov/authver.shtml


Jeffrey W. Bullock, Secretary of State
AUTHENTICATION: 8430215

DATE: 12-15-10

AK

State of West Virginia



Certificate

*I, Natalie E. Tennant, Secretary of State of the
State of West Virginia, hereby certify that*

NOBLE ENERGY MARKETING, INC.

Control Number: 99D1Z

a corporation formed under the laws of Delaware has filed its "Application for Certificate of Authority" to transact business in West Virginia as required by the provisions of the West Virginia Code. I hereby declare the organization to be registered as a foreign corporation from its effective date of January 29, 2009.

Therefore, I issue this

CERTIFICATE OF AUTHORITY

to the corporation authorizing it to transact business in West Virginia



*Given under my hand and the
Great Seal of the State of
West Virginia on this day of
January 29, 2009*

Natalie E. Tennant

Secretary of State

FILED

Stampen

JAN 29 2009

Nathalie E. Turner
Secretary of State
State Capitol
1900 Kanawha Blvd. E.
Charleston, WV 25305
FILE ONE ORIGINAL
FEE \$ PER SCHEDULE



IN THE OFFICE OF
SECRETARY OF STATE
WEST VIRGINIA

Penney Barker, Manager
Corporations Division
Tel. (304) 538-8000
Fax (304) 538-3381
www.wvssa.com
Hours: 8:30am-5:00pm
PLEASE READ INSTRUCTIONS

**CERTIFICATE OF
AUTHORITY**

CTRL # _____

1. HOME STATE INFORMATION:

- a. The name of the corporation as it is registered in its home state is: Noble Energy Marketing, Inc.
- b. State of Delaware Date of Incorporation January 18, 1994 Duration (if yes, or perpetuity) Perpetual
Warning: The reporting requirements in West Va. will not end until a withdrawal is filed.
- c. NAIC # _____ (If an insurance company)

2. PRINCIPAL OFFICE INFORMATION:

- a. Address of the principal office of the corporation: No. & Street 100 Glenborough Drive, Suite 100
Houston, TX 77067
City/State/Zip _____
- b. Mailing address, if different, from above address: Street/PO Box _____
City/State/Zip _____

3. WEST VIRGINIA INFORMATION:

- a. Corporate taxes to be paid in W. Va.: (check one, follow instructions)
☒ Home state taxes as listed on line 1.a. above, if available.
☐ DBA taxes
- b. Address of registered office in West Virginia, if any: No. & Street 707 Virginia Street East
Charleston, WV 25301
City/State/Zip _____
- c. Mailing address in WV, if different, from above: Street/PO Box _____
City/State/Zip _____
- d. Proposed purpose(s) for transaction of business in WV: Oil & gas

4. AGENT OF PROCESS:
Properly designated person to whom notice of process may be sent, if any:

Name C T Corporation System
Address 707 Virginia Street East, Charleston, WV 25301

5. CORPORATE STATUS INFORMATION:

- a. Corporation is organized as (check one): ☒ For-profit
☐ Non-profit

b. Directors and Officers: (Add extra page if necessary; please list all officers)

Office	Name	Address
--------	------	---------

Please see attached list.

6. The number of acres of land it holds or expects to hold in West Virginia is: None

7. Contact and Signature Information

- | | | |
|----|---|-----------------------------|
| a. | <u>Joint Pages</u> | <u>201.572.3100</u> |
| | Contact Name | Phone Number |
| b. | <u>Kirk A. Moore</u> | <u>Assistant Secretary</u> |
| | Print or type name of signer | Title or Capacity of Signer |
| c. | Signature of Signer: <u>Kirk A. Moore</u> | Date: <u>Jan 28, 2009</u> |

NOBLE ENERGY MARKETING, INC.
a Delaware corporation

Directors

Charles D. Davidson
100 Glenborough Drive, Suite 100
Houston, Texas 77067

Chris Tong
100 Glenborough Drive, Suite 100
Houston, Texas 77067

Arnold J. Johnson
100 Glenborough Drive, Suite 100
Houston, Texas 77067

Officers

<u>Name</u>	<u>Title(s)</u>	<u>Address</u>
Charles D. Davidson	Chief Executive Officer	100 Glenborough Drive, Suite 100 Houston, Texas 77067
David L. Stover	Vice President	100 Glenborough Drive, Suite 100 Houston, Texas 77067
Arnold J. Johnson	Vice President, General Counsel, and Secretary	100 Glenborough Drive, Suite 100 Houston, Texas 77067
Chris Tong	Vice President - Finance and Treasurer	100 Glenborough Drive, Suite 100 Houston, Texas 77067
Kirk A. Moore	Assistant Secretary	100 Glenborough Drive, Suite 100 Houston, Texas 77067

Delaware

PAGE 1

The First State

I, JEFFREY W. BULLOCK, SECRETARY OF STATE OF THE STATE OF DELAWARE, DO HEREBY CERTIFY "NOBLE ENERGY MARKETING, INC." IS DULY INCORPORATED UNDER THE LAWS OF THE STATE OF DELAWARE AND IS IN GOOD STANDING AND HAS A LEGAL CORPORATE EXISTENCE SO FAR AS THE RECORDS OF THIS OFFICE SHOW, AS OF THE TWENTY-NINTH DAY OF JANUARY, A.D. 2009.

AND I DO HEREBY FURTHER CERTIFY THAT THE SAID "NOBLE ENERGY MARKETING, INC." WAS INCORPORATED ON THE EIGHTEENTH DAY OF JANUARY, A.D. 1994.

AND I DO HEREBY FURTHER CERTIFY THAT THE ANNUAL REPORTS HAVE BEEN FILED TO DATE.


AND I DO HEREBY FURTHER CERTIFY THAT THE FRANCHISE TAXES HAVE BEEN PAID TO DATE.

2372438 8300

090081032

You may verify this certificate online
at corp.delaware.gov/authvar.shtml



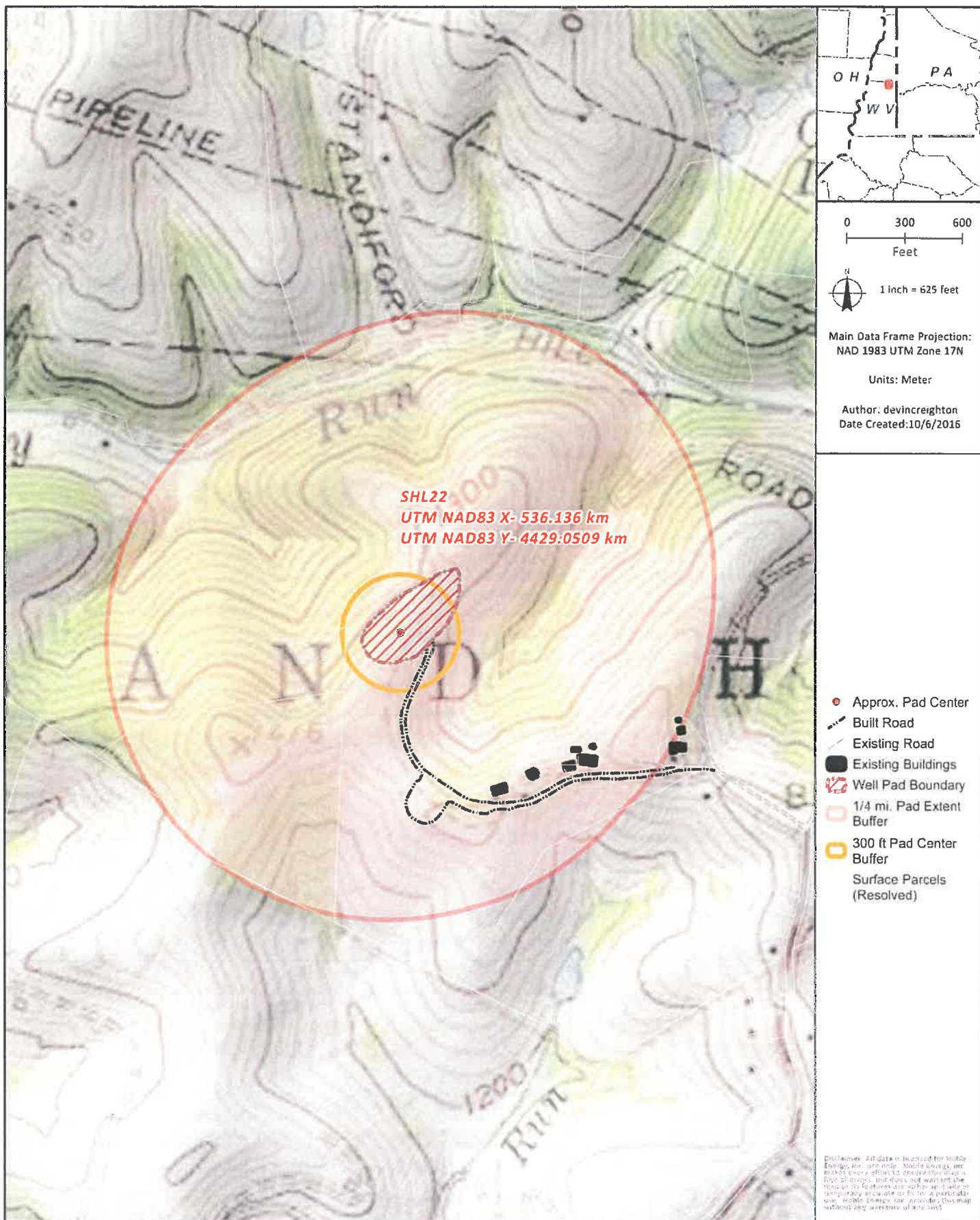

Jeffrey W. Bullock, Secretary of State
AUTHENTICATION: 7106879

DATE: 01-29-09

Noble Energy, Inc
SHL 22 Production Facility
Permit G70-A Application

ATTACHMENT B

Area Map



ATTACHMENT D

Regulatory Discussion

The following Federal and State air pollution control regulations will, or may apply to the SHL 22 Production Facility.

45CSR 2 Particulate Air Pollution from Combustion of Fuel in Indirect Heat Exchangers.

Noble Energy will be subject to the opacity requirements of this rule.

45CSR4 Objectionable Odors

45CSR6 To Prevent and Control Air Pollution from the Combustion of Refuse.

The SHL 22 Facility will operate an enclosed combustion device and a flare.

45CSR13 Permits for Construction, Modification, Relocation, and Operation of Stationary Sources of Air Pollutants.

Noble Energy is required to submit a construction application.

45CSR16 Standards of Performance for New Stationary Sources Pursuant to 40CFR60.

The SHL 22 facility will have one engine subject to 40CFR60, Subpart JJJJ, 8 wells, one pneumatic diaphragm pump and storage tanks subject to 40CFR60, Subpart OOOOa.

45CSR22 Air Quality Management Fee Program

Noble Energy will pay a \$1,000 construction application fee, a \$1,000 NSPS fee and a \$200 Certificate To Operate fee.

40CFR60 Subpart JJJJ - Standards of performance for Spark Ignition Internal Combustion Engines.

Noble Energy will install one engine that is subject to this subpart.

40CFR60 Subpart OOOOa - Standards of performance for Crude Oil and Natural Gas Facilities for which Construction, Modification or Reconstruction Commenced After September 18, 2015

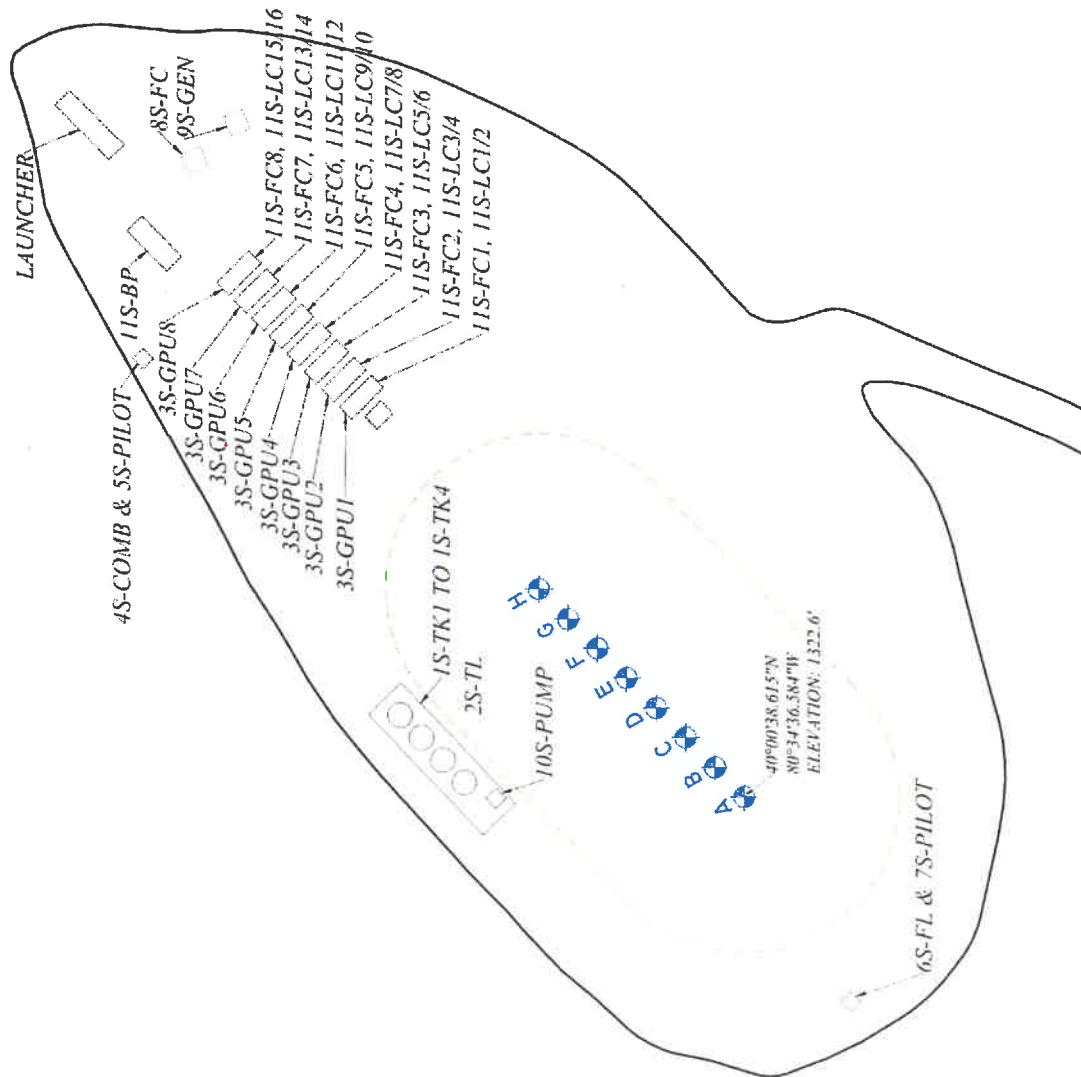
The SHL 22 facility will have equipment subject to 40CFR60, Subpart OOOOa.

Noble Energy, Inc
SHL 22 Production Facility
Permit G70-A Application

ATTACHMENT E

Plot Plan

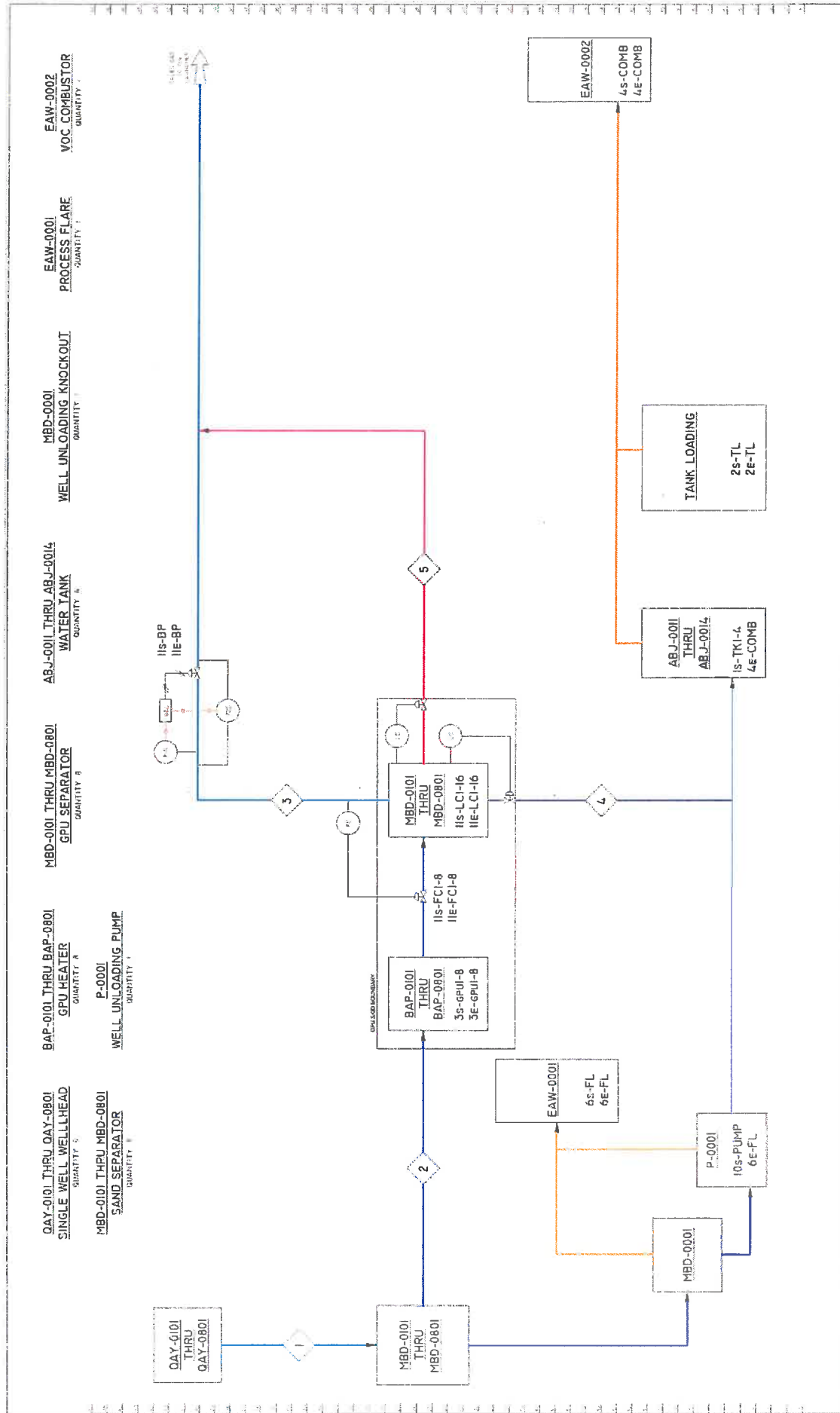
Emission Unit ID	Emission Unit Description
1S-TK1	400 BBL PRODUCED WATER TANK
1S-TK2	400 BBL PRODUCED WATER TANK
1S-TK3	400 BBL PRODUCED WATER TANK
1S-TK4	400 BBL PRODUCED WATER TANK
2S-TL	WATER TANK UNLOADING EMISSIONS
3S-GPU1	2.0 MMBTU/HR HEATER
3S-GPU2	2.0 MMBTU/HR HEATER
3S-GPU3	2.0 MMBTU/HR HEATER
3S-GPU4	2.0 MMBTU/HR HEATER
3S-GPU5	2.0 MMBTU/HR HEATER
3S-GPU6	2.0 MMBTU/HR HEATER
3S-GPU7	2.0 MMBTU/HR HEATER
3S-GPU8	2.0 MMBTU/HR HEATER
4S-COMB	VAPOR COMBUSTOR - Leed Fab EC48
5S-PILOT	COMBUSTOR PILOT EMISSIONS
6S-FL	PROCESS FLARE - NOV
7S-PILOT	FLARE PILOT EMISSIONS
8S-FC	FUEL CELL ELECTRIC GENERATOR
9S-GEN	ARROW ENGINE COMPANY GAS GENERATOR
10S-PUMP	SANDPIPER G20 DIAPHRAGM PUMP
11S-FC1 THRU 8	GPU FLOW VALVE CONTROLLER
11S-BP	BACKPRESSURE VALVE CONTROLLER
11S-LC1 THRU 16	GPU LEVEL CONTROLLERS
FUG	EQUIPMENT COMPONENT FUGITIVES ESTIMATE



Noble Energy, Inc
SHL 22 Production Facility
Permit G70-A Application

ATTACHMENT D

Process Flow Diagram



ATTACHMENT G

Process Description

The SHL 22 is an oil and natural gas production facility.

Condensate, gas, sand and water come from eight (8) natural gas wells through eight (8) sand separators.

Sand is routed to the Unloading Vessel which will also be used for well liquids unloading, controlled by flare [6C-FL]. Accumulated sand will be removed periodically for proper disposal

Liquids from the Unloading Vessel will be transferred to the produced water tanks by Diaphragm Pump [10S-Pump] controlled by flare [6C-FL].

From the sand separators, the stream is routed to eight (8) Gas Production Units and Heaters [3S-GPU1-8] where fluid separation occurs, controlled by sixteen (16) Pneumatic Level Control Valves [11S-LC1-16].

Flow to the GPUs will be controlled by eight (eight) Pneumatic Flow Control Valves [11S-FC1-8].

Produced water from the separators flows into four (4) Water Tanks [1S-TK1-4] controlled by one (1) Vapor Combustor [4C-COMB].

Condensate and gas is routed from the GPUs directly to sales through one (1) Pneumatic Back Pressure Control Valve [11S-BP].

Produced water will be trucked or pumped off location. Any loading emissions will be controlled by Vapor Combustor [4C-COMB].

If line power is not available, facility power will be generated by one (1) ARROW C-106 32, hp 4SRB engine [9S-GEN] or Acumentrics Remote Power System [8S-FC].

Source Aggregation Determination

Building, structure, facility, or installation are defined as all pollutant emitting activities which belong to the same industrial grouping, are located on one or more contiguous and adjacent properties, and are under common control.

The SHL 22 will operate under SIC code 1311. There are no other Noble Energy, Inc. facilities located on contiguous or adjacent properties to the site.

Attachment I
Emission Units Table

(includes all emission units and air pollution control devices)

Emission Unit ID ¹	Emission Point ID ²	Emission Unit Description	Year Installed/ Modified	Design Capacity	Type ³ and Date of Change	Control Device ⁴
1S-TK1-4	4E-COMB	400 bbl Produced Water Tanks	2016	400 bbl each	New	4C-COMB
2S-TL1	2E-TL1	Produced water truck loadout	2016	2044000 bbl/yr	New	4C-COMB
3S-GPU1	3E-GPU1	GPU Burner	2016	2.00 MMBtu/hr	New	NONE
3S-GPU2	3E-GPU2	GPU Burner	2016	2.00 MMBtu/hr	New	NONE
3S-GPU3	3E-GPU3	GPU Burner	2016	2.00 MMBtu/hr	New	NONE
3S-GPU4	3E-GPU4	GPU Burner	2016	2.00 MMBtu/hr	New	NONE
3S-GPU5	3E-GPU5	GPU Burner	2016	2.00 MMBtu/hr	New	NONE
3S-GPU6	3E-GPU6	GPU Burner	2016	2.00 MMBtu/hr	New	NONE
3S-GPU7	3E-GPU7	GPU Burner	2016	2.00 MMBtu/hr	New	NONE
3S-GPU8	3E-GPU8	GPU Burner	2016	2.00 MMBtu/hr	New	NONE
4S-COMB	4E-COMB	One (1) Vapor Combustor	2016	6000 scf/hr	New	NONE
5S-PILOT	5E-PILOT	One (1) Vapor Combustor Pilot	2016	12.5 scf/hr	New	NONE
6S-FL	6E-FL	flare	2016	74.727 MMBtu/hr	New	NONE
7S-PILOT	7E-PILOT	Flare Pilot	2016	0.264 MMBtu/hr	New	NONE
8S-FC	8E-FC	Fuel Cell	2016	1.44 gal propane/day	New	NONE
9S-GEN	9E-GEN	ARROW C-106 Engine	2016	32 hp	New	NONE
10S-Pump	6E-FL	Sandpiper Diaphragm Pump	2016	20 scf/min	New	6C-FL
11S-FC1-8	11E-FC1-8	Pneumatic Flow Control Valves	2016	6.00 scf/hr	New	NONE
11S-BP	11E-BP	Pneumatic Back Pressure Control Valve	2016	6.00 scf/hr	New	NONE
11S-LC1-16	11E-LC1-16	Pneumatic Level Control Valves	2016	0.02 scf/hr	New	NONE

¹ For Emission Units (or Sources) use the following numbering system: 1S, 2S, 3S,... or other appropriate designation.

² For Emission Points use the following numbering system: 1E, 2E, 3E, ... or other appropriate designation.

³ New, modification, removal

⁴ For Control Devices use the following numbering system: 1C, 2C, 3C, . . or other appropriate designation.

Noble Energy, Inc. SHL 22 Production Facility

ATTACHMENT J

Emissions Summary Sheets

Emission Point ID No. (Must match Emission Units Table & Plot Plan)	Emission Point Type	Emission Unit Verified Through This Point (Must match Emission Units Table & Plot Plan)			Air Pollution Control Device (Must match Emission Units Table & Plot Plan)		Vent Time for Emission Unit (chemical processes only)	At Risk Pollutants - Chemical Name/CAS# (Specify VOCs & HAPs) See Detail Sheets	Maximum Potential Uncontrolled Emissions ²			Maximum Potential Controlled Emissions ⁴	Emission Form or Phase (d) (e.g., Gas, Liquid or Solid Vapor)	Est. Method Used ⁵	Emission Concentration (lbm / or mgm / m ³)
		ID No.	Source	Device Type	ID No.	lb/yr									
						lb/yr			lb/hr						
2E-TL1	Vent	2E-TL1	Produced water truck loadout	N/A	N/A	N/A	N/A	VOC	0.53	2.30	0.53	2.30	Gas/Vapor	AP-42	
3E-GPU1	Heater Stack	3S-GPU1	GPU Burner	N/A	N/A	N/A	N/A	HAPs	0.00	0.48	0.00	0.48	Gas/Vapor	AP-42	
								NOx	0.17	0.73	0.17	0.73	Gas/Vapor	AP-42	
								CO	0.14	0.61	0.14	0.61	Gas/Vapor	AP-42	
								VOC	0.01	0.04	0.01	0.04	Gas/Vapor	AP-42	
								SO2	0.00	0.00	0.00	0.00	Gas/Vapor	AP-42	
								PM10	0.01	0.06	0.01	0.06	Particulate	AP-42	
								Formaldehyde	0.00	0.00	0.00	0.00	Gas/Vapor	AP-42	
3E-GPU2	Heater Stack	3S-GPU2	GPU Burner	N/A	N/A	N/A	N/A	HAPs	0.00	0.01	0.00	0.01	Gas/Vapor	AP-42	
								CO2e	200.10	876.42	200.10	876.42	Gas/Vapor	AP-42	
								NOx	0.17	0.73	0.17	0.73	Gas/Vapor	AP-42	
								CO	0.14	0.61	0.14	0.61	Gas/Vapor	AP-42	
								VOC	0.01	0.04	0.01	0.04	Gas/Vapor	AP-42	
								SO2	0.00	0.00	0.00	0.00	Gas/Vapor	AP-42	
								PM10	0.01	0.06	0.01	0.06	Particulate	AP-42	
3E-GPU3	Heater Stack	3S-GPU3	GPU Burner	N/A	N/A	N/A	N/A	Formaldehyde	0.00	0.00	0.00	0.00	Gas/Vapor	AP-42	
								HAPs	0.00	0.01	0.00	0.01	Gas/Vapor	AP-42	
								CO2e	200.10	876.42	200.10	876.42	Gas/Vapor	AP-42	
								NOx	0.17	0.73	0.17	0.73	Gas/Vapor	AP-42	
								CO	0.14	0.61	0.14	0.61	Gas/Vapor	AP-42	
								VOC	0.01	0.04	0.01	0.04	Gas/Vapor	AP-42	
								SO2	0.00	0.00	0.00	0.00	Gas/Vapor	AP-42	
3E-GPU4	Heater Stack	3S-GPU4	GPU Burner	N/A	N/A	N/A	N/A	PM10	0.01	0.06	0.01	0.06	Particulate	AP-42	
								Formaldehyde	0.00	0.00	0.00	0.00	Gas/Vapor	AP-42	
								HAPs	0.00	0.01	0.00	0.01	Gas/Vapor	AP-42	
								CO2e	200.10	876.42	200.10	876.42	Gas/Vapor	AP-42	
								NOx	0.17	0.73	0.17	0.73	Gas/Vapor	AP-42	
								CO	0.14	0.61	0.14	0.61	Gas/Vapor	AP-42	
								VOC	0.01	0.04	0.01	0.04	Gas/Vapor	AP-42	
3E-GPU5	Heater Stack	3S-GPU5	GPU Burner	N/A	N/A	N/A	N/A	SO2	0.00	0.00	0.00	0.00	Gas/Vapor	AP-42	
								PM10	0.01	0.06	0.01	0.06	Particulate	AP-42	
								Formaldehyde	0.00	0.00	0.00	0.00	Gas/Vapor	AP-42	
								HAPs	0.00	0.01	0.00	0.01	Gas/Vapor	AP-42	
								CO2e	200.10	876.42	200.10	876.42	Gas/Vapor	AP-42	
								NOx	0.17	0.73	0.17	0.73	Gas/Vapor	AP-42	
								CO	0.14	0.61	0.14	0.61	Gas/Vapor	AP-42	
3E-GPU6	Heater Stack	3S-GPU6	GPU Burner	N/A	N/A	N/A	N/A	VOC	0.01	0.04	0.01	0.04	Gas/Vapor	AP-42	
								SO2	0.00	0.00	0.00	0.00	Gas/Vapor	AP-42	
								PM10	0.01	0.06	0.01	0.06	Particulate	AP-42	
								Formaldehyde	0.00	0.00	0.00	0.00	Gas/Vapor	AP-42	
								HAPs	0.00	0.01	0.00	0.01	Gas/Vapor	AP-42	
								CO2e	200.10	876.42	200.10	876.42	Gas/Vapor	AP-42	
								NOx	0.17	0.73	0.17	0.73	Gas/Vapor	AP-42	

EMISSION SUMMARY SHEET
Noble Energy, Inc. SHL 22 Production Facility

Emission Point ID No. (Units, Tables & Pict Plan)	Emission Point Type	Emission Unit Vented Through This Point (Must match Emission Units Table & Pict Plan)		Air Pollution Control Device (must match Emission Units Table & Pict Plan)	Vent Time for Emission Unit (chemical processes only)	All Regulated Pollutants - Chemical NameCAS ² (See Detail Sheets)	Maximum Potential Uncontrolled Emissions		Maximum Potential Controlled Emissions	Emission Form or Phase (A, Solid, Liquid or Gas/Vapor)	Emission Concentration (ppmv or mg/m ³)
		ID No	Source				lb/hr	lb/yr			
3E-GPU7	Heater Stack	3S-GPU7	GPU Burner	N/A	N/A	NOx	0.17	0.73	0.17	Gas/Vapor	AP-42
						CO	0.14	0.61	0.14	Gas/Vapor	AP-42
						VOC	0.01	0.04	0.01	Gas/Vapor	AP-42
						SO ₂	0.00	0.00	0.00	Gas/Vapor	AP-42
3E-GPU8	Heater Stack	3S-GPU8	GPU Burner	N/A	N/A	PM10	0.01	0.06	0.01	Particulate	AP-42
						Formaldehyde	0.00	0.00	0.00	Gas/Vapor	AP-42
						HAPs	0.00	0.01	0.00	Gas/Vapor	AP-42
						CO ₂ e	200.10	876.42	200.10	Gas/Vapor	AP-42
4E-COMB	Stack	4S-COMB	One (1) Vapor Combustor	N/A	N/A	NOx	0.80	3.48	0.80	Gas/Vapor	AP-42
						CO	4.33	18.96	4.33	Gas/Vapor	AP-42
						VOC	---	---	---	Gas/Vapor	AP-42
						SO ₂	0.01	0.05	0.01	Gas/Vapor	AP-42
4E-COMB	Stack	4S-TL1	One (1) Vapor Combustor	N/A	N/A	PM10	---	---	---	Particulate	AP-42
						CO ₂	1376.51	6029.09	1376.51	Gas/Vapor	AP-42
						VOC	5.81	25.44	0.12	Gas/Vapor	FESCO Study / Tanks
						HAPs	0.00	0.00	0.01	Gas/Vapor	FESCO Study / Tanks
5E-PILOT	Stack	5S-PILOT	One (1) Vapor Combustor Pilot	N/A	N/A	VOC	1.23	5.37	0.02	Gas/Vapor	AP-42
						HAPs	0.26	1.13	0.01	Gas/Vapor	AP-42
						NOx	0.00	0.01	0.00	Gas/Vapor	AP-42
						CO	0.00	0.00	0.00	Gas/Vapor	AP-42
6E-FL	Stack	6S-FL	flare	N/A	N/A	VOC	0.00	0.00	0.00	Gas/Vapor	AP-42
						PM10	0.00	0.00	0.00	Particulate	AP-42
						NOx	0.21	0.93	0.21	Gas/Vapor	AP-42
						CO	1.15	5.04	1.15	Gas/Vapor	AP-42
6E-FL	Stack	10S-Pump	Sandpaper Diaphragm Pump	N/A	N/A	VOC	916.82	167.28	18.18	Gas/Vapor	AP-42
						HAPs	66.69	12.77	1.33	Gas/Vapor	AP-42
						CO ₂	366.22	1604.02	366.22	Gas/Vapor	AP-42
						NOx	0.00	0.02	0.00	Gas/Vapor	AP-42
7E-PILOT	Stack	7S-PILOT	Flare Pilot	N/A	N/A	CO	0.02	0.10	0.02	Gas/Vapor	AP-42
						VOC	7.87	1.44	0.16	Gas/Vapor	HYSYS
						HAPs	0.58	0.11	0.01	Gas/Vapor	HYSYS
						CO ₂	7.17	31.42	7.17	Gas/Vapor	AP-42
8E-FC	Stack	8S-FC	Fuel Cell	N/A	N/A	NOx	0.02	0.09	0.02	Gas/Vapor	AP-42
						CO	0.02	0.08	0.02	Gas/Vapor	AP-42
						VOC	0.00	0.01	0.00	Gas/Vapor	AP-42
						CO ₂	25.97	113.74	25.97	Gas/Vapor	AP-42
8E-FC	Stack	8S-FC	Fuel Cell	N/A	N/A	NOx	0.00	0.00	0.00	Gas/Vapor	AP-42
						CO	0.00	0.00	0.00	Gas/Vapor	AP-42
						VOC	0.00	0.00	0.00	Gas/Vapor	AP-42
						SO ₂	0.00	0.00	0.00	Gas/Vapor	AP-42
8E-FC	Stack	8S-FC	Fuel Cell	N/A	N/A	PM10	0.00	0.00	0.00	Particulate	AP-42
						CO ₂ e	0.75	3.29	0.75	Gas/Vapor	AP-42

EMISSION SUMMARY SHEET
Noble Energy, Inc. SHL 22 Production Facility

Emission Point ID No. (Must match Emission Units Table & P&ID Plan)	Emission Point Type ¹	Emission Unit Vented Through This Point (Must match Emission Units Table & P&ID Plan)		Air Pollution Control Device (Must match Emission Units Table & P&ID Plan)		Vent Time for Emission Unit (chemical processing unit)		Air Regulated Pollutants - Chemical Name/CAS ² (Specify VOCs & HAPs) See Data Sheets	Maximum Potential Uncontrolled Emissions ³		Maximum Potential Controlled Emissions ⁴		Emission Form or Phase (AI, Gas, Solid, Liquid or Gas/Vapor)	Est. Method Used ⁵	Emission Concentration ⁶ (lb/mv or mg/m ³)
		ID No.	Source	ID No.	Device Type	Short Term ⁷	Max (hr/yr)		lb/yr	ton/yr	lb/yr	ton/yr			
9E-GEN	Engine Stack	9E-GEN	ARROW C-105 Engine	9E-GEN CAT	NSCR	N/A	N/A	NOx	0.99	4.33	0.20	0.87	Gas/Vapor	Manufacturer	
								CO	0.81	3.55	0.34	1.48	Gas/Vapor	Manufacturer	
								VOC	N/A	N/A	N/A	N/A	Gas/Vapor	Manufacturer	
								SO2	0.00	0.00	0.00	0.00	Gas/Vapor	AP-42	
								PM10	0.00	0.01	0.00	0.01	Particulate	AP-42	
								Formaldehyde	0.01	0.03	0.01	0.03	Gas/Vapor	AP-42	
11E-FC1-B	Vent	11E-FC1-B	Pneumatic Flow Control Valves	N/A	N/A	N/A	N/A	HAPs	38.34	167.91	38.34	167.91	Gas/Vapor	AP-42	
								CO2e	0.01	0.03	0.01	0.03	Gas/Vapor	AP-42	
								VOC	2.46	10.76	2.46	10.76	Gas/Vapor	HYSYS	
								HAPs	0.20	0.86	0.20	0.86	Gas/Vapor	HYSYS	
								CO2e	331.25	1450.88	331.25	1450.88	Gas/Vapor	HYSYS	
								VOC	0.31	1.34	0.31	1.34	Gas/Vapor	HYSYS	
11E-BP	Vent	11E-BP	Pneumatic Back Pressure Control Valve	N/A	N/A	N/A	N/A	HAPs	0.02	0.11	0.02	0.11	Gas/Vapor	HYSYS	
								CO2e	41.41	181.35	41.41	181.35	Gas/Vapor	HYSYS	
								VOC	0.01	0.05	0.01	0.05	Gas/Vapor	HYSYS	
								HAPs	0.20	0.80	0.20	0.80	Gas/Vapor	HYSYS	
								CO2e	1.84	8.06	1.84	8.06	Gas/Vapor	HYSYS	

Attachment K

FUGITIVE EMISSIONS DATA SUMMARY SHEET

The FUGITIVE EMISSIONS SUMMARY SHEET provides a summation of fugitive emissions. Fugitive emissions are those emissions which could not reasonably pass through a stack, chimney, vent or other functionally equivalent opening. Note that uncaptured process emissions are not typically considered to be fugitive, and must be accounted

for on the appropriate EMISSIONS UNIT DATA SHEET and on the EMISSION POINTS DATA SUMMARY SHEET. Please note that total emissions from the source are equal to all vented emissions, all fugitive emissions, plus all other emissions (e.g. uncaptured emissions).

APPLICATION FORMS CHECKLIST - FUGITIVE EMISSIONS	
1.) Will there be haul road activities?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If YES, then complete the HAUL ROAD EMISSIONS UNIT DATA SHEET.
2.) Will there be Storage Piles?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If YES, complete Table 1 of the NONMETALLIC MINERALS PROCESSING EMISSIONS UNIT DATA SHEET.
3.) Will there be Liquid Loading/Unloading Operations?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No If YES, complete the BULK LIQUID TRANSFER OPERATIONS EMISSIONS UNIT DATA SHEET.
4.) Will there be emissions of air pollutants from Wastewater Treatment Evaporation?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
5.) Will there be Equipment Leaks (e.g. leaks from pumps, compressors, in-line process valves, pressure relief devices, open-ended valves, sampling connections, flanges, agitators, cooling towers, etc.)?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No If YES, complete the LEAK SOURCE DATA SHEET section of the CHEMICAL PROCESSES EMISSIONS UNIT DATA SHEET.
6.) Will there be General Clean-up VOC Operations?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If YES, complete the GENERAL EMISSIONS UNIT DATA SHEET.
7.) Will there be any other activities that generate fugitive emissions?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If YES, complete the GENERAL EMISSIONS UNIT DATA SHEET or the most appropriate form.

If you answered "NO" to all of the items above, it is not necessary to complete the following table, "Fugitive Emissions Summary."

FUGITIVE EMISSIONS SUMMARY	Air Regulated Pollutants Chemical Name/CAS ¹	Maximum Uncontrolled Potential Emissions ²		Maximum Potential Controlled Emissions		Est. Method Used ³
		lb/hr	ton/yr	lb/hr	ton/yr	
Haul Road/Road Dust Emissions Paved Haul Roads						
Unpaved Haul Roads						
Storage Pile Emissions						
Loading/Unloading Operations	VOCs	1.75	7.67	0.53	2.30	EE / EPA
	HAPs	0.00	1.61	0.00	0.48	EE / EPA
Wastewater Treatment Evaporation & Operations						
Equipment Leaks	VOCs	Does not apply	7.72	Does not apply	7.72	EE/EPA
	HAPs	Does not apply	0.51	Does not apply	0.51	EE/EPA
General Clean-up VOC Emissions						
Other						

¹ List all regulated air pollutants. Speciate VOCs, including all HAPs. Follow chemical name with Chemical Abstracts Service (CAS) number. LIST Acids, G

VOCs, H₂S, Inorganics, Lead, Organics, O₃, NO, NO₂, SO₂, SO₃, all applicable Greenhouse Gases (including CO₂ and methane), etc. DO NOT LIST H₂, H₂O₂, and Noble Gases.

² Give rate with no control equipment operating. If emissions occur for less than 1 hr, then record emissions per batch in minutes (e.g. 5 lb VOC/20 minute batch).

³ Give rate with proposed control equipment operating. If emissions occur for less than 1 hr, then record emissions per batch in minutes (e.g. 5 lb VOC/20 minute batch).

⁴ Indicate method used to determine emission rate as follows: MB = material balance; ST = stack test (give date of test); EE = engineering estimate; O = other (specify).

LEAK SOURCE DATA SHEET (Please see attached fugitive emissions spreadsheet)

Source Category	Pollutant	Number of Source Components ¹	Number of Components Monitored by Frequency ²	Average Time to Repair (days) ³	Estimated Annual Emission Rate (lb/yr) ⁴
Pumps ⁵	light liquid VOC ^{6,7}	1	Bi-annually	15	251
	heavy liquid VOC ⁸				
	Non-VOC ⁹				
Valves ¹⁰	Gas VOC	90	Bi-annually	15	1251
	Light Liquid VOC	64	Bi-annually	15	3090
	Heavy Liquid VOC				
Safety Relief Valves ¹¹	Non-VOC				
	Gas VOC	16	Bi-annually	15	49
	Non VOC				
Open-ended Lines ¹²	VOC	8	Bi-annually	15	49
	Non-VOC				
Sampling Connections ¹³ Connectors	VOC				
	Non-VOC				
	VOC				
Compressors	Non-VOC				
	VOC	148	Bi-annually	15	159
	Non-VOC				
Flanges	VOC				
Other	VOC	88	Bi-annually	15	9382
	Non-VOC				

¹⁻¹³ See notes on the following page.

SHL 22 Production Facility Equipmt Component Fugitives Estimate

FUG

	Counts	Emission Factor ¹ lb/hr/component	% Control Efficiency	% VOC	VOC Emissions		Benzene	Toluene	E-benzene	Xylene	n-Hexane	224-TMP		%CH4	CH4 Emissions		CO ₂ e
					lb/hr	tpy						lb/yr	tpy		lb/hr	tpy	
Valve	Gas/Vapor	90	0.00992	0	16	0.63	0.18	0.38	0.04	0.61	13.06	0.00	0.00	59.83	0.53	2.34	49.13
	Light Liquid ¹	64	0.00551	0	100	1.54	3.55	19.00	4.63	35.68	235.08	24.71	0.38	1.17	0.00	0.02	0.38
	Water/Oil	64	0.000216	0	50	0.03	0.14	0.74	0.18	1.40	0.92	0.00	0.01	1.17	0.00	0.00	0.01
Pumps/Seals	Light Liquid	1	0.02866	0	100	0.03	0.29	1.54	0.38	2.90	19.11	2.01	0.03	1.17	0.00	0.00	0.03
	Water/Oil	1	0.0000529	0	50	0.00	0.00	0.00	0.00	0.01	0.04	0.00	0.00	1.17	0.00	0.00	0.00
Flanges	Gas/Vapor	60	0.00086	0	16	0.04	0.01	0.02	0.00	0.04	0.75	0.00	0.00	59.83	0.03	0.14	2.84
	Light Liquid	40	0.000243	0	100	0.04	0.10	0.52	0.13	0.98	6.48	0.68	0.08	100	0.01	0.04	0.89
Open-Ended Lines	Water/Oil	48	0.0000617	0	50	0.00	0.00	0.02	0.00	0.03	0.02	0.00	0.00	100	0.00	0.00	0.03
	Gas/Vapor	8	0.00441	0	16	0.02	0.01	0.02	0.00	0.02	0.52	0.00	0.00	59.83	0.02	0.09	1.94
Other	Light Liquid	0	0.00309	0	100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100	0.00	0.00	0.00
	Water/Oil	0	0.000%	0	50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100	0.00	0.00	0.00
Connectors	Gas/Vapor	24	0.0194	0	16	0.07	0.09	0.20	0.02	0.32	6.81	0.00	0.00	59.83	0.28	1.22	25.62
	Light Liquid ¹	8	0.0165	0	100	0.13	1.33	7.11	1.73	13.36	88.00	9.25	0.58	100	0.13	0.58	12.14
	Water/Oil	56	0.0309	0	50	0.87	17.43	93.22	22.74	175.08	115.35	0.00	0.00	100	1.73	7.58	159.16
Connectors	Gas/Vapor	425	0.00441	0	16	0.03	0.04	0.08	0.01	0.13	2.74	0.00	0.00	59.83	0.11	0.49	10.31
	Light Liquid	200	0.00463	0	100	0.09	0.93	4.99	1.22	9.37	61.73	6.49	0.41	100	0.09	0.41	8.52
	Water/Oil	112	0.000243	0	50	0.01	0.27	1.47	0.36	2.75	1.81	0.00	0.00	100	0.03	0.12	2.50
Total Emissions					1.75	7.72	24.11	127.85	31.09	239.92	550.61	43.14	2.95			12.91	271.02

Note

1 Heavy liquids are defined as having vapor pressure 0.044 psia or less at 68°F. Light liquids are defined as having vapor pressure higher than 0.044 psia at 68°F.

2 Factors from EPA Document EPA-453 R-95-017, November 1995

Attachment L

EMISSIONS UNIT DATA SHEET

STORAGE TANKS

Provide the following information for each new or modified bulk liquid storage tank.

I. GENERAL INFORMATION (required)

1. Bulk Storage Area Name SWL 22 Produced Water Tank Battery	2. Tank Name 400 bbl Produced Water Tanks
3. Emission Unit ID number IS-TK1-4	4. Emission Point ID number IE-TK1-4
5. Date installed or Modified <i>(for existing tanks)</i>	6. Type of change: <input checked="" type="checkbox"/> New Construction <input type="checkbox"/> New Stored Material <input type="checkbox"/> Other
7A. Description of Tank Modification <i>(if applicable)</i>	
7B. Will more than one material be stored in this tank? <i>If so, a separate form must be completed for each material.</i> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
7C. Provide any limitations on source operation affecting emissions. (production variation, etc.)	

I. TANK INFORMATION (required)

8. Design Capacity <i>(specify barrels or gallons)</i> . Use the internal cross-sectional area multiplied by internal height. 400 bbl	
9A. Tank Internal Diameter (ft.) 12	9B. Tank Internal Height (ft.) 20
10A. Maximum Liquid Height (ft.) 19.5	10B. Average Liquid Height (ft.) 10
11A. Maximum Vapor Space Height (ft.) 18.3	11B. Average Vapor Space Height (ft.) 10
12. Nominal Capacity <i>(specify barrels or gallons)</i> . This is also known as "working volume." 393 bbl	
13A. Maximum annual throughput (gals/yr) per tank 21,462,000	13B. Maximum daily throughput (gal/day) per tank 58,800
14. Number of tank turnovers per year 1278 per tank	15. Maximum tank fill rate (gal/min) 1171.8
16. Tank fill method <input checked="" type="checkbox"/> Submerged <input type="checkbox"/> Splash <input type="checkbox"/> Bottom Loading	
17. Is the tank system a variable vapor space system? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If yes, (A) What is the volume expansion capacity of the system (gal)? (B) What are the number of transfers into the system per year?	
18. Type of tank (check all that apply): <input checked="" type="checkbox"/> Fixed Roof <input checked="" type="checkbox"/> vertical <input type="checkbox"/> horizontal <input type="checkbox"/> flat roof <input checked="" type="checkbox"/> cone roof <input type="checkbox"/> dome roof <input type="checkbox"/> other (describe) <input type="checkbox"/> External Floating Roof <input type="checkbox"/> pontoon roof <input type="checkbox"/> double deck roof <input type="checkbox"/> Domed External (or Covered) Floating Roof <input type="checkbox"/> Internal Floating Roof <input type="checkbox"/> vertical column support <input type="checkbox"/> self-supporting <input type="checkbox"/> Variable Vapor Space <input type="checkbox"/> litter roof <input type="checkbox"/> diaphragm <input type="checkbox"/> Pressurized <input type="checkbox"/> spherical <input type="checkbox"/> cylindrical <input type="checkbox"/> Underground <input type="checkbox"/> Other (Describe)	

SECTION III (required if did not provide TANKS Summary Sheets)

TANK CONSTRUCTION AND OPERATION INFORMATION		
19. Tank Shell Construction: <input type="checkbox"/> Riveted <input type="checkbox"/> Gunite Lined <input type="checkbox"/> Epoxy Covered rivets <input checked="" type="checkbox"/> Other (describe) welded		
20A. Shell Color green	20B. Roof Color green	20C. Year Last Painted new
21. Shell Condition (if metal and unlined) <input type="checkbox"/> Riveted <input type="checkbox"/> Light Rust <input type="checkbox"/> Dense Rust <input checked="" type="checkbox"/> Not Applicable		
22A. Is the tank heated? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	22B. If yes, operating temperature: na	22C. If yes, how is heat provided to tank? na
23. Operating Pressure Range (psig) -0.025 - 1		
24. Is the tank a Vertical Fixed Roof Tank? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	24A. If yes, for dome roof provide radius (ft):	24B. If yes, for cone roof, provide slope (ft/ft): 0.083
25. Complete item 25 for Floating Roof Tanks <input checked="" type="checkbox"/> Does not apply		
25A. Year Internal Floaters Installed		
25B. Primary Seal Type (check one): <input type="checkbox"/> Metallic (mechanical) <input type="checkbox"/> Liquid mounted resilient seal <input type="checkbox"/> Vapor mounted resilient seal <input type="checkbox"/> Other (Describe):		
25C. Is the Floating Roof equipped with a secondary seal? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		
25D. If yes, how is the secondary seal mounted? (check one): <input type="checkbox"/> Shoe <input type="checkbox"/> Rim		
25E. Is the floating roof equipped with a weather shield? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		
25F. Describe deck fittings:		

IPA EPA Lianison Factor MB Material Balance SS Similar Source ST Similar Source Test Throughput Data U Other (specify)

TANK TRUCK LOADING EMISSION UNIT DATA SHEET

Furnish the following information for each new or modified bulk liquid transfer area or loading rack at the natural gas production pad. This form is to be used for bulk liquid transfer operations to tank trucks.

Identification Number (Emission Unit ID from Equipment List):		2S-TL1		Emission Point ID:		2E-TL1 4E-COMB	
2. Type of cargo vessels accommodated at this rack or transfer point (check as many as apply):							
<input type="checkbox"/> Drums		<input type="checkbox"/> Marine Vessels		<input type="checkbox"/> Rail Tank Cars		<input checked="" type="checkbox"/> Tank Trucks	
3. Loading Area Data:							
Number of pumps:				1			
Number of liquids loaded:				1			
Maximum number of tank trucks loading at one time:				1			
4. Does ballasting of marine vessels occur at this loading area?							
<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Does not apply							
5. Describe cleaning location, compounds and procedure for tank trucks:							
N/A							
6. Are tank trucks pressure tested for leaks at this or any other location?							
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No							
If YES, describe:							
7. Projected Maximum Operating Schedule (for rack or transfer point as a whole):							
Maximum	Jan. - Mar.	Apr. - June	July - Sept.	Oct. - Dec.			
hours/day	24	24	24	24			
days/week	7	7	7	7			

B. Bulk Liquid Data (add pages as necessary)			
Pump ID No.	TBD		
Liquid Name	Produced Water		
Max. daily throughput (1000 gal/day)	235.2		
Max. annual throughput (1000 gal/yr)	85,848		
Loading Method	SUB		
Max. Fill Rate (gal/min)	TBD		
Average Fill Time (min loading)	TBD		
Max. Bulk Liquid Temperature (°F)	59.9		
True Vapor Pressure *	3.75		
Cargo Vessel Condition *	TBD		
Control Equipment or Method †	TO - 4C-COMB		
Minimum collection efficiency (%)	70%		
Minimum control efficiency (%)	98%		
* Continued on next page			

Maximum Emission Rate	Loading (lb/hr)	1.75	uncontrolled		
	Annual (ton/yr)	7.67	uncontrolled		
Estimation Method ¹		EPA			
Notes:					
¹ BF = Bottom Fill, SP = Splash Fill, SUB = Submerged Fill					
² At maximum bulk liquid temperature					
³ B = Ballasted Vessel, C = Cleaned, U = Uncleaned (dedicated service), O = other (describe)					
⁴ List as many as apply (complete and submit appropriate Air Pollution Control Device Sheets as Attachment "H").					
CA = Carbon Adsorption					
VIB = Dedicated Vapor Balance (closed system)					
ECD = Enclosed Combustion Device					
F = Flare					
TO = Thermal Oxidation or Incineration					
⁵ EPA = EPA Emission Factor as stated in AP-42					
MB = Material Balance					
TM = Test Measurement based upon test data submitted					
O = other (describe)					

9. Proposed Monitoring, Recordkeeping, Reporting, and Testing

Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.

MONITORING	RECORDKEEPING
Track Loading Throughput	Maintain loading throughput records.
REPORTING	TESTING
Upon Request	NA
MONITORING Please list and describe the process parameters and ranges that are proposed to be monitored in order to demonstrate compliance with the operation of this process equipment operation air pollution control device.	
RECORDKEEPING Please describe the proposed recordkeeping that will accompany the monitoring.	
REPORTING Please describe the proposed frequency of reporting of the recordkeeping.	
TESTING Please describe any proposed emissions testing for this process equipment air pollution control device.	
10 Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty.	

NATURAL GAS FIRED FUEL BURNING UNITS EMISSION DATA SHEET

Complete the information on this data for each Gas Producing Unit(s), Heater Treater(s), and in-line heater(s) at the production pad. Reboiler information should be entered on the Glycol Dehydration Emission Unit Data Sheet.

Emission Unit ID # ¹	Emission Point ID# ²	Emission Unit Description (Manufacturer / Model #)	Year Installed/ Modified	Type ³ and Date of Change	Control Device ⁴	Design Heat Input (mmBtu/hr) ⁵	Fuel Heating Value (Btu/scf) ⁶
3S-GPU1	3E-GPU1	Heater	2017	New	None	2.0	1200
3S-GPU2	3E-GPU2	Heater	2017	New	None	2.0	1200
3S-GPU3	3E-GPU3	Heater	2017	New	None	2.0	1200
3S-GPU4	3E-GPU4	Heater	2017	New	None	2.0	1200
3S-GPU5	3E-GPU5	Heater	2017	New	None	2.0	1200
3S-GPU6	3E-GPU6	Heater	2017	New	None	2.0	1200
3S-GPU7	3E-GPU7	Heater	2017	New	None	2.0	1200
3S-GPU8	3E-GPU8	Heater	2017	New	None	2.0	1200

¹ Enter the appropriate Emission Unit (or Source) identification numbers for each fuel burning unit located at the production pad. Gas Producing Unit Burners should be designated GPU-1, GPU-2, etc. Heater Treater(s) should be designated HT-1, HT-2, etc. Heaters or Line Heaters should be designated LH-1, LH-2, etc. For sources, use 1S, 2S, 3S... or other appropriate designation. Enter glycol dehydration unit Reboiler Vent data on the Glycol Dehydration Unit Data Sheet.

² Enter the appropriate Emission Point identification numbers for each fuel burning unit located at the production pad. Gas Producing Unit Burners should be designated GPU-1, GPU-2, etc. Heater Treater(s) should be designated HT-1, HT-2, etc. Heaters or Line Heaters should be designated LH-1, LH-2, etc. For emission points, use 1E, 2E, 3E... or other appropriate designation. New, modification, removal

³ Complete appropriate air pollution control device sheet for any control device.

⁴ Enter design heat input capacity in mmBtu/hr.

⁵ Enter the fuel heating value in Btus/standard cubic foot.

NATURAL GAS COMPRESSOR/GENERATOR ENGINE DATA SHEET

Source Identification Number ¹		9S-GEN					
Engine Manufacturer and Model		ARROW C-106					
Manufacturer's Rated bhp/rpm		32 @ 800					
Source Status ²		NS					
Date Installed/Modified/Removed ³		2/1/2017					
Engine Manufactured/Reconstruction Date ⁴		TBD					
Is this a Certified Stationary Spark Ignition Engine according to 40CFR60 Subpart JJJJ? (Yes or No) ⁵		NO					
Engine, Fuel and Combustion Data	Engine Type ⁶	RD+S					
	APCD Type ⁷	A/F NSCR					
	Fuel Type ⁸	RG					
	H ₂ S (gr/100 scf)	<0.2					
	Operating bhp/rpm	32 @ 800					
	BSFC (Btu/bhp-hr)	10350					
	Fuel throughput (ft ³ /hr)	12780					
	Fuel throughput (MMft ³ /yr)	111.95					
Reference ⁹	Operation (hrs/yr)	8760					
	Potential Emissions ¹⁰	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr
	NO _x	0.20	0.87				
	CO	0.34	1.48				
	VOC ¹¹	0.01	0.04				
	SO ₂	0.00	0.00				
	PM ₁₀	0.00	0.01				
	Formaldehyde	0.01	0.03				

1. Enter the appropriate Source Identification Number for each natural gas-fueled reciprocating internal combustion compressor/generator engine located at the compressor station. Multiple compressor engines should be designated CE-1, CE-2, CE-3 etc. Generator engines should be designated GE-1, GE-2, GE-3 etc. If more than three (3) engines exist, please use additional sheets.

2. Enter the Source Status using the following codes:

NS Construction of New Source (installation) ES Existing Source

MS Modification of Existing Source RS Removal of Source

Attachment L
EMISSIONS UNIT DATA SHEET
GENERAL

To be used for affected sources other than asphalt plants, foundries, incinerators, indirect heat exchangers, and quarries.

Identification Number (as assigned on *Equipment List Form*): **10S-PUMP**

<p>1. Name or type and model of proposed affected source: Sandpiper Diaphragm Pump</p>
<p>2. On a separate sheet(s), furnish a sketch(es) of this affected source. If a modification is to be made to this source, clearly indicated the change(s). Provide a narrative description of all features of the affected source which may affect the production of air pollutants.</p>
<p>3. Name(s) and maximum amount of proposed process material(s) charged per hour: NA</p>
<p>4. Name(s) and maximum amount of proposed material(s) produced per hour: NA</p>
<p>5. Give chemical reactions, if applicable, that will be involved in the generation of air pollutants: NA</p>

* The identification number which appears here must correspond to the air pollution control device identification number appearing on the *List Form*.

6. Combustion Data (if applicable): (a) Type and amount in appropriate units of fuel(s) to be burned: NA		
(b) Chemical analysis of proposed fuel(s), excluding coal, including maximum percent sulfur and ash: NA		
(c) Theoretical combustion air requirement (ACF/unit of fuel): <div style="text-align: center; margin-top: 10px;"> @ °F and psia. </div>		
(d) Percent excess air:		
(e) Type and BTU/hr of burners and all other firing equipment planned to be used: NA		
(f) If coal is proposed as a source of fuel, identify supplier and seams and give sizing of the coal as it will be fired: NA		
(g) Proposed maximum design heat input: × 10 ⁶ BTU/hr.		
7. Projected operating schedule:		
Hours/Day 1	Days/Week 7	Weeks/Year 52

8. Projected amount of pollutants that would be emitted from this affected source if no control devices were used:

@	°F and	psia
a. NO _x	lb/hr	grains/ACF
b. SO ₂	lb/hr	grains/ACF
c. CO	lb/hr	grains/ACF
d. PM ₁₀	lb/hr	grains/ACF
e. Hydrocarbons	lb/hr	grains/ACF
f. VOCs	7.87 lb/hr	grains/ACF
g. Pb	lb/hr	grains/ACF
h. Specify other(s)		
HAPs	0.58 lb/hr	grains/ACF
	lb/hr	grains/ACF
	lb/hr	grains/ACF
	lb/hr	grains/ACF

NOTE: (1) An Air Pollution Control Device Sheet must be completed for any air pollution device(s) used to control emissions from this affected source.

(2) Complete the Emission Points Data Sheet.

9. Proposed Monitoring, Recordkeeping, Reporting, and Testing
Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.

MONITORING

RECORDKEEPING

REPORTING

TESTING

MONITORING. PLEASE LIST AND DESCRIBE THE PROCESS PARAMETERS AND RANGES THAT ARE PROPOSED TO BE MONITORED IN ORDER TO DEMONSTRATE COMPLIANCE WITH THE OPERATION OF THIS PROCESS EQUIPMENT OPERATION/AIR POLLUTION CONTROL DEVICE.

RECORDKEEPING. PLEASE DESCRIBE THE PROPOSED RECORDKEEPING THAT WILL ACCOMPANY THE MONITORING.

REPORTING. PLEASE DESCRIBE THE PROPOSED FREQUENCY OF REPORTING OF THE RECORDKEEPING.

TESTING. PLEASE DESCRIBE ANY PROPOSED EMISSIONS TESTING FOR THIS PROCESS EQUIPMENT/AIR POLLUTION CONTROL DEVICE.

10. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty

Maximum 100 PSI, exhaust routed to control device if/when driven by natural gas.

Attachment L
EMISSIONS UNIT DATA SHEET
GENERAL

To be used for affected sources other than asphalt plants, foundries, incinerators, indirect heat exchangers, and quarries.

Identification Number (as assigned on *Equipment List Form*): **11S-FC1 THROUGH 8**

1. Name or type and model of proposed affected source: FISCHER CONTROL DVC 6200 Continuous Bleed Pneumatic Controller Low Bleed
2. On a separate sheet(s), furnish a sketch(es) of this affected source. If a modification is to be made to this source, clearly indicated the change(s). Provide a narrative description of all features of the affected source which may affect the production of air pollutants.
3. Name(s) and maximum amount of proposed process material(s) charged per hour: NA
4. Name(s) and maximum amount of proposed material(s) produced per hour: NA
5. Give chemical reactions, if applicable, that will be involved in the generation of air pollutants: NA

* The identification number which appears here must correspond to the air pollution control device identification number appearing on the *List Form*.

6. Combustion Data (if applicable): (a) Type and amount in appropriate units of fuel(s) to be burned: NA		
(b) Chemical analysis of proposed fuel(s), excluding coal, including maximum percent sulfur and ash: NA		
(c) Theoretical combustion air requirement (ACF/unit of fuel): <div style="text-align: center; margin-top: 10px;"> @ °F and psia. </div>		
(d) Percent excess air:		
(e) Type and BTU/hr of burners and all other firing equipment planned to be used: NA		
(f) If coal is proposed as a source of fuel, identify supplier and seams and give sizing of the coal as it will be fired: NA		
(g) Proposed maximum design heat input: × 10 ⁶ BTU/hr.		
7. Projected operating schedule:		
Hours/Day 24	Days/Week 7	Weeks/Year 52

8. Projected amount of pollutants that would be emitted from this affected source if no control devices were used:

@	°F and	psia
a. NO _x	lb/hr	grains/ACF
b. SO ₂	lb/hr	grains/ACF
c. CO	lb/hr	grains/ACF
d. PM ₁₀	lb/hr	grains/ACF
e. Hydrocarbons	lb/hr	grains/ACF
f. VOCs	2.46 lb/hr	grains/ACF
g. Pb	lb/hr	grains/ACF
h. Specify other(s)		
HAPs	0.20 lb/hr	grains/ACF
	lb/hr	grains/ACF
	lb/hr	grains/ACF
	lb/hr	grains/ACF

NOTE: (1) An Air Pollution Control Device Sheet must be completed for any air pollution device(s) used to control emissions from this affected source.

(2) Complete the Emission Points Data Sheet.

9. Proposed Monitoring, Recordkeeping, Reporting, and Testing
Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.

MONITORING

RECORDKEEPING

REPORTING

TESTING

MONITORING. PLEASE LIST AND DESCRIBE THE PROCESS PARAMETERS AND RANGES THAT ARE PROPOSED TO BE MONITORED IN ORDER TO DEMONSTRATE COMPLIANCE WITH THE OPERATION OF THIS PROCESS EQUIPMENT OPERATION/AIR POLLUTION CONTROL DEVICE.

RECORDKEEPING. PLEASE DESCRIBE THE PROPOSED RECORDKEEPING THAT WILL ACCOMPANY THE MONITORING.

REPORTING. PLEASE DESCRIBE THE PROPOSED FREQUENCY OF REPORTING OF THE RECORDKEEPING.

TESTING. PLEASE DESCRIBE ANY PROPOSED EMISSIONS TESTING FOR THIS PROCESS EQUIPMENT/AIR POLLUTION CONTROL DEVICE.

10. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty

< 6SCF/hr

Attachment L
EMISSIONS UNIT DATA SHEET
GENERAL

To be used for affected sources other than asphalt plants, foundries, incinerators, indirect heat exchangers, and quarries.

Identification Number (as assigned on *Equipment List Form*): **11S-BP**

1. Name or type and model of proposed affected source:

FISCHER CONTROL

DVC 6200

Continuous Bleed Pneumatic Controller

Low Bleed

2. On a separate sheet(s), furnish a sketch(es) of this affected source. If a modification is to be made to this source, clearly indicated the change(s). Provide a narrative description of all features of the affected source which may affect the production of air pollutants.

3. Name(s) and maximum amount of proposed process material(s) charged per hour:

NA

4. Name(s) and maximum amount of proposed material(s) produced per hour:

NA

5. Give chemical reactions, if applicable, that will be involved in the generation of air pollutants:

NA

* The identification number which appears here must correspond to the air pollution control device identification number appearing on the *List Form*.

6. Combustion Data (if applicable): (a) Type and amount in appropriate units of fuel(s) to be burned: NA		
(b) Chemical analysis of proposed fuel(s), excluding coal, including maximum percent sulfur and ash: NA		
(c) Theoretical combustion air requirement (ACF/unit of fuel): <div style="text-align: center;">@ °F and psia.</div>		
(d) Percent excess air:		
(e) Type and BTU/hr of burners and all other firing equipment planned to be used: NA		
(f) If coal is proposed as a source of fuel, identify supplier and seams and give sizing of the coal as it will be fired: NA		
(g) Proposed maximum design heat input: × 10 ⁶ BTU/hr.		
7. Projected operating schedule:		
Hours/Day 24	Days/Week 7	Weeks/Year 52

8. Projected amount of pollutants that would be emitted from this affected source if no control devices were used:

@ °F and psia		
a. NO _x	lb/hr	grains/ACF
b. SO ₂	lb/hr	grains/ACF
c. CO	lb/hr	grains/ACF
d. PM ₁₀	lb/hr	grains/ACF
e. Hydrocarbons	lb/hr	grains/ACF
f. VOCs	0.31 lb/hr	grains/ACF
g. Pb	lb/hr	grains/ACF
h. Specify other(s)		
HAPs	0.02 lb/hr	grains/ACF
	lb/hr	grains/ACF
	lb/hr	grains/ACF
	lb/hr	grains/ACF

NOTE: (1) An Air Pollution Control Device Sheet must be completed for any air pollution device(s) used to control emissions from this affected source.

(2) Complete the Emission Points Data Sheet.

9. Proposed Monitoring, Recordkeeping, Reporting, and Testing
Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.

MONITORING

RECORDKEEPING

REPORTING

TESTING

MONITORING. PLEASE LIST AND DESCRIBE THE PROCESS PARAMETERS AND RANGES THAT ARE PROPOSED TO BE MONITORED IN ORDER TO DEMONSTRATE COMPLIANCE WITH THE OPERATION OF THIS PROCESS EQUIPMENT OPERATION/AIR POLLUTION CONTROL DEVICE.

RECORDKEEPING. PLEASE DESCRIBE THE PROPOSED RECORDKEEPING THAT WILL ACCOMPANY THE MONITORING.

REPORTING. PLEASE DESCRIBE THE PROPOSED FREQUENCY OF REPORTING OF THE RECORDKEEPING.

TESTING. PLEASE DESCRIBE ANY PROPOSED EMISSIONS TESTING FOR THIS PROCESS EQUIPMENT/AIR POLLUTION CONTROL DEVICE.

10. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty

< 6SCF/hr

Attachment L
EMISSIONS UNIT DATA SHEET
GENERAL

To be used for affected sources other than asphalt plants, foundries, incinerators, indirect heat exchangers, and quarries.

Identification Number (as assigned on *Equipment List Form*): **11S-LC1 THROUGH 16**

1. Name or type and model of proposed affected source:

KIMRAY SEPARATOR LEVEL CONTROLLER
GEN II LEVEL CONTROLLER
INTERMITENT BLEED

2. On a separate sheet(s), furnish a sketch(es) of this affected source. If a modification is to be made to this source, clearly indicated the change(s). Provide a narrative description of all features of the affected source which may affect the production of air pollutants.

3. Name(s) and maximum amount of proposed process material(s) charged per hour:

NA

4. Name(s) and maximum amount of proposed material(s) produced per hour:

NA

5. Give chemical reactions, if applicable, that will be involved in the generation of air pollutants:

NA

* The identification number which appears here must correspond to the air pollution control device identification number appearing on the *List Form*.

6. Combustion Data (if applicable):		
(a) Type and amount in appropriate units of fuel(s) to be burned:		
NA		
(b) Chemical analysis of proposed fuel(s), excluding coal, including maximum percent sulfur and ash:		
NA		
(c) Theoretical combustion air requirement (ACF/unit of fuel):		
@	°F and	psia.
(d) Percent excess air:		
(e) Type and BTU/hr of burners and all other firing equipment planned to be used:		
NA		
(f) If coal is proposed as a source of fuel, identify supplier and seams and give sizing of the coal as it will be fired:		
NA		
(g) Proposed maximum design heat input:		
		× 10 ⁶ BTU/hr.
7. Projected operating schedule:		
Hours/Day	24	
Days/Week	7	
Weeks/Year	52	

NA

NA

@

°F and

psia.

NA

NA

(f) If coal is proposed as a source of fuel, identify supplier and seams and give sizing of the coal as it will be fired:

 $\times 10^6 \text{ BTU/hr.}$

7. Projected operating schedule:

Hours/Day 24

Days/Week 7

Weeks/Year 52

8. Projected amount of pollutants that would be emitted from this affected source if no control devices were used:

@	°F and	psia
a. NO _x	lb/hr	grains/ACF
b. SO ₂	lb/hr	grains/ACF
c. CO	lb/hr	grains/ACF
d. PM ₁₀	lb/hr	grains/ACF
e. Hydrocarbons	lb/hr	grains/ACF
f. VOCs	0.01 lb/hr	grains/ACF
g. Pb	lb/hr	grains/ACF
h. Specify other(s)		
HAPs	0.20 lb/hr	grains/ACF
	lb/hr	grains/ACF
	lb/hr	grains/ACF
	lb/hr	grains/ACF

NOTE: (1) An Air Pollution Control Device Sheet must be completed for any air pollution device(s) used to control emissions from this affected source.

(2) Complete the Emission Points Data Sheet.

9. Proposed Monitoring, Recordkeeping, Reporting, and Testing
Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.

MONITORING

RECORDKEEPING

REPORTING

TESTING

MONITORING. PLEASE LIST AND DESCRIBE THE PROCESS PARAMETERS AND RANGES THAT ARE PROPOSED TO BE MONITORED IN ORDER TO DEMONSTRATE COMPLIANCE WITH THE OPERATION OF THIS PROCESS EQUIPMENT OPERATION/AIR POLLUTION CONTROL DEVICE.

RECORDKEEPING. PLEASE DESCRIBE THE PROPOSED RECORDKEEPING THAT WILL ACCOMPANY THE MONITORING.

REPORTING. PLEASE DESCRIBE THE PROPOSED FREQUENCY OF REPORTING OF THE RECORDKEEPING.

TESTING. PLEASE DESCRIBE ANY PROPOSED EMISSIONS TESTING FOR THIS PROCESS EQUIPMENT/AIR POLLUTION CONTROL DEVICE.

10. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty

0.02 SCF/hr

Noble Energy, Inc. SHL 22 Production Facility

ATTACHMENT M

Air Pollution Control Device Sheets

Attachment M
Air Pollution Control Device Sheet
 (FLARE SYSTEM)

Control Device ID No. (must match Emission Units Table): **4C-COMB**

Equipment Information

1. Manufacturer: LEED Fabrication Model No. LDF 1350	2. Method: <input type="checkbox"/> Elevated flare <input checked="" type="checkbox"/> Ground flare <input type="checkbox"/> Other Describe
3. Provide diagram(s) of unit describing capture system with duct arrangement and size of duct, air volume, capacity, horsepower of movers. If applicable, state hood face velocity and hood collection efficiency.	
4. Method of system used: <input type="checkbox"/> Steam-assisted <input type="checkbox"/> Air-assisted <input type="checkbox"/> Pressure-assisted <input checked="" type="checkbox"/> Non-assisted	
5. Maximum capacity of flare: <div style="text-align: right; margin-right: 50px;"> 100 scf/min 6,000 scf/hr </div>	6. Dimensions of stack: <div style="text-align: right;"> Diameter 4 ft. Height 25 ft. </div>
7. Estimated combustion efficiency: (Waste gas destruction efficiency) <div style="text-align: right; margin-right: 50px;"> Estimated: 99 % Minimum guaranteed: 99 % </div>	8. Fuel used in burners: <input checked="" type="checkbox"/> Natural Gas <input type="checkbox"/> Fuel Oil, Number <input type="checkbox"/> Other, Specify:
9. Number of burners: 1 Rating: 11.7 BTU/hr	11. Describe method of controlling flame: NA
10. Will preheat be used? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
12. Flare height: 25 ft	14. Natural gas flow rate to flare pilot flame per pilot light: <div style="text-align: right;"> NSCR scf/min 12.5 scf/hr </div>
13. Flare tip inside diameter: ft	
15. Number of pilot lights: 1 <div style="text-align: right; margin-right: 50px;"> Total 15,000 BTU/hr </div>	16. Will automatic re-ignition be used? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
17. If automatic re-ignition will be used, describe the method: piezoelectric igniter	
18. Is pilot flame equipped with a monitor? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No If yes, what type? <input checked="" type="checkbox"/> Thermocouple <input type="checkbox"/> Infra-Red <input type="checkbox"/> Ultra Violet <input type="checkbox"/> Camera with monitoring control room <input type="checkbox"/> Other, Describe:	
19. Hours of unit operation per year: 8760	

Steam Injection

20. Will steam injection be used? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	21. Steam pressure PSIG Minimum Expected: Design Maximum:
22. Total Steam flow rate: LB/hr	23. Temperature: °F
24. Velocity ft/sec	25. Number of jet streams
26. Diameter of steam jets: in	27. Design basis for steam injected: LB steam/LB hydrocarbon
28. How will steam flow be controlled if steam injection is used?	

Characteristics of the Waste Gas Stream to be Burned

29. Name	Quantity Grains of H ₂ S/100 ft ³	Quantity (LB/hr, ft ³ /hr, etc)	Source of Material
Storage Tank, TL Vapor	NA	10.52 lb/hr	Tanks and Loading Vapor
30. Estimate total combustible to flare: 10.52 lb/hr LB/hr or ACF/hr (Maximum mass flow rate of waste gas) scfm			
31. Estimated total flow rate to flare including materials to be burned, carrier gases, auxiliary fuel, etc.: 10.52 lb/hr LB/hr or ACF/hr			
32. Give composition of carrier gases: NA			
33. Temperature of emission stream: TBD °F Heating value of emission stream: 1950 BTU/ft ³ Mean molecular weight of emission stream: MW = 21.85 lb/lb-mole		34. Identify and describe all auxiliary fuels to be burned. BTU/scf BTU/scf BTU/scf BTU/scf	
35. Temperature of flare gas: 70 °F		36. Flare gas flow rate: 6,000 scf/min	
37. Flare gas heat content: 1950 BTU/ft ³		38. Flare gas exit velocity: ft/sec	
39. Maximum rate during emergency for one major piece of equipment or process unit: NA scf/min			
40. Maximum rate during emergency for one major piece of equipment or process unit: NA BTU/min			
41. Describe any air pollution control device inlet and outlet gas conditioning processes (e.g., gas cooling, gas reheating, gas humidification):			
42. Describe the collection material disposal system:			
43. Have you included Flare Control Device in the Emissions Points Data Summary Sheet?			

44. Proposed Monitoring, Recordkeeping, Reporting, and Testing

Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.

MONITORING:

Periodic visible emission monitoring per regulation.

RECORDKEEPING:

Pilot records

REPORTING:

In accordance with regulation(s).

TESTING:

In accordance with regulation(s).

MONITORING:

Please list and describe the process parameters and ranges that are proposed to be monitored in order to demonstrate compliance with the operation of this process equipment or air control device.

RECORDKEEPING:

Please describe the proposed recordkeeping that will accompany the monitoring.

REPORTING:

Please describe any proposed emissions testing for this process equipment on air pollution control device.

TESTING:

Please describe any proposed emissions testing for this process equipment on air pollution control device.

45. Manufacturer's Guaranteed Capture Efficiency for each air pollutant.

100%

46. Manufacturer's Guaranteed Control Efficiency for each air pollutant.

98%

47. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty.

Attachment M
Air Pollution Control Device Sheet
 (FLARE SYSTEM)

Control Device ID No. (must match Emission Units Table): **6C-FL**

Equipment Information

1. Manufacturer: National Oilwell Varco Model No. Produced Gas Flare	2. Method: <input checked="" type="checkbox"/> Elevated flare <input type="checkbox"/> Ground flare <input type="checkbox"/> Other Describe
3. Provide diagram(s) of unit describing capture system with duct arrangement and size of duct, air volume, capacity, horsepower of movers. If applicable, state hood face velocity and hood collection efficiency.	
4. Method of system used: <input type="checkbox"/> Steam-assisted <input type="checkbox"/> Air-assisted <input type="checkbox"/> Pressure-assisted <input checked="" type="checkbox"/> Non-assisted	
5. Maximum capacity of flare: <div style="text-align: right;">729.17 scf/min</div> <div style="text-align: right;">43,750 scf/hr</div>	6. Dimensions of stack: <div style="text-align: right;">Diameter 0.25 ft.</div> <div style="text-align: right;">Height 20.17 ft.</div>
7. Estimated combustion efficiency: (Waste gas destruction efficiency) <div style="text-align: right;">Estimated: 99 %</div> <div style="text-align: right;">Minimum guaranteed: 98 %</div>	8. Fuel used in burners: <input checked="" type="checkbox"/> Natural Gas <input type="checkbox"/> Fuel Oil, Number <input type="checkbox"/> Other, Specify:
9. Number of burners: 1 <div style="text-align: right;">Rating: 78 MM BTU/hr</div>	11. Describe method of controlling flame: Adjust manual choke upstream of unloading vessel to regulate pressure.
10. Will preheat be used? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
12. Flare height: 22.67 ft	14. Natural gas flow rate to flare pilot flame per pilot light: <div style="text-align: right;">NSCR scf/min</div> <div style="text-align: right;">240 scf/hr</div>
13. Flare tip inside diameter: 0.33 ft	
15. Number of pilot lights: 1 <div style="text-align: right;">Total 264,000 BTU/hr</div>	16. Will automatic re-ignition be used? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
17. If automatic re-ignition will be used, describe the method: NA - Flare is only operational while personnel are present and routing stream to vessel.	
18. Is pilot flame equipped with a monitor? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No If yes, what type? <input checked="" type="checkbox"/> Thermocouple <input type="checkbox"/> Infra-Red <input type="checkbox"/> Ultra Violet <input type="checkbox"/> Camera with monitoring control room <input type="checkbox"/> Other, Describe:	
19. Hours of unit operation per year: 365	

Steam Injection

20. Will steam injection be used? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	21. Steam pressure PSIG Minimum Expected: Design Maximum:
22. Total Steam flow rate: LB/hr	23. Temperature: °F
24. Velocity ft/sec	25. Number of jet streams
26. Diameter of steam jets: in	27. Design basis for steam injected: LB steam/LB hydrocarbon
28. How will steam flow be controlled if steam injection is used?	

Characteristics of the Waste Gas Stream to be Burned

29. Name	Quantity Grains of H ₂ S/100 ft ³	Quantity (LB/hr, ft ³ /hr, etc)	Source of Material
Well Unloading Gas	NA	2320 lb/hr	Wellhead

30. Estimate total combustible to flare: 2320 lb/hr (Maximum mass flow rate of waste gas)	LB/hr or ACF/hr scfm
31. Estimated total flow rate to flare including materials to be burned, carrier gases, auxiliary fuel, etc.: 2320 lb/hr LB/hr or ACF/hr	
32. Give composition of carrier gases: NA	
33. Temperature of emission stream: TBD °F Heating value of emission stream: 1150 BTU/ft ³ Mean molecular weight of emission stream: MW = lb/lb-mole	34. Identify and describe all auxiliary fuels to be burned. BTU/scf BTU/scf BTU/scf BTU/scf
35. Temperature of flare gas: °F	36. Flare gas flow rate: 729.17 scf/min
37. Flare gas heat content: BTU/ft³	38. Flare gas exit velocity: 12.4 ft/sec
39. Maximum rate during emergency for one major piece of equipment or process unit: NA scf/min	
40. Maximum rate during emergency for one major piece of equipment or process unit: NA BTU/min	
41. Describe any air pollution control device inlet and outlet gas conditioning processes (e.g., gas cooling, gas reheating, gas humidification):	
42. Describe the collection material disposal system:	
43. Have you included Flare Control Device in the Emissions Points Data Summary Sheet?	

44. Proposed Monitoring, Recordkeeping, Reporting, and Testing Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.	
MONITORING: Personnel monitoring at all times when flare is oper:	RECORDKEEPING: Track volume of gas flowed to flare.
REPORTING: In accordance with regulation(s).	TESTING: In accordance with regulation(s).
MONITORING: RECORDKEEPING: REPORTING: TESTING:	Please list and describe the process parameters and ranges that are proposed to be monitored in order to demonstrate compliance with the operation of this process equipment or air control device. Please describe the proposed recordkeeping that will accompany the monitoring. Please describe any proposed emissions testing for this process equipment on air pollution control device. Please describe any proposed emissions testing for this process equipment on air pollution control device.
45. Manufacturer's Guaranteed Capture Efficiency for each air pollutant. 100%	
46. Manufacturer's Guaranteed Control Efficiency for each air pollutant. 98%	
47. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty. 125 psig Max. inlet pressure	

**AIR POLLUTION CONTROL DEVICE
(OTHER COLLECTORS)**

Control Device ID No. (must match Emission Units Table): **9C-GEN CAT**

Equipment Information	
1. Manufacturer: TBD	2. Control Device Name: 9C-GEN CAT Type: NSCR Catalyst
3. Provide diagram(s) of unit describing capture system with duct arrangement and size of duct, air volume, capacity, horsepower of movers. If applicable, state hood face velocity and hood collection efficiency.	
4. On a separate sheet(s) supply all data and calculations used in selecting or designing this collection device.	
5. Provide a scale diagram of the control device showing internal construction.	
6. Submit a schematic and diagram with dimensions and flow rates.	
7. Guaranteed minimum collection efficiency for each pollutant collected: 100%	
8. Attached efficiency curve and/or other efficiency information.	
9. Design inlet volume: SCFM	10. Capacity:
11. Indicate the liquid flow rate and describe equipment provided to measure pressure drop and flow rate, if any.	
N/A	
12. Attach any additional data including auxiliary equipment and operation details to thoroughly evaluate the control equipment. N/A	
13. Description of method of handling the collected material(s) for reuse or disposal. N/A	

Gas Stream Characteristics		
14. Are halogenated organics present?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
Are particulates present?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
Are metals present?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
15. Inlet Emission stream parameters:	Maximum	Typical
Pressure (mmHg):	Not Specified	
Heat Content (BTU/scf):	1400	1220
Oxygen Content (%):	Not Specified	
Moisture Content (%):	Not Specified	
Relative Humidity (%):	Not Specified	

16. Type of pollutant(s) controlled: SO _x Odor Particulate (type): Other NO _x						
17. Inlet gas velocity: TBD ft/sec			18. Pollutant specific gravity: N/A			
19. Gas flow into the collector: ACF @ °F and PSIA			20. Gas stream temperature: Inlet: °F Outlet: 960 °F			
21. Gas flow rate: Design Maximum: ACFM Average Expected: ACFM			22. Particulate Grain Loading in grains/scf: N/A Inlet: Outlet:			
23. Emission rate of each pollutant (specify) into and out of collector:						
Pollutant	IN Pollutant		Emission Capture Efficiency	OUT Pollutant		Control Efficiency
	lb/hr	grains/acf		lb/hr	grains/acf	
A NO _x	0.99		100	0.20		80
B VOC	0.34		100	0.34		0
C CO	0.81		100	0.34		58
D						
E						
24. Dimensions of stack: Height ft. Diameter ft.						
25. Supply a curve showing proposed collection efficiency versus gas volume from 25 to 130 percent of design rating of collector.						

Particulate Distribution

26. Complete the table:	Particle Size Distribution at Inlet to Collector	Fraction Efficiency of Collector
Particulate Size Range (microns)	Weight % for Size Range	Weight % for Size Range
0 – 2	N/A	
2 – 4		
4 – 6		
6 – 8		
8 – 10		
10 – 12		
12 – 16		
16 – 20		
20 – 30		
30 – 40		
40 – 50		
50 – 60		
60 – 70		
70 – 80		
80 – 90		
90 – 100		
>100		

27. Describe any air pollution control device inlet and outlet gas conditioning processes (e.g., gas cooling, gas reheating, gas humidification): N/A	
28. Describe the collection material disposal system: Catalyst elements can be cleaned and/or replaced; materials are not disposed of on site.	
29. Have you included Other Collectors Control Device in the Emissions Points Data Summary Sheet?	
30. Proposed Monitoring, Recordkeeping, Reporting, and Testing	
Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.	
MONITORING:	RECORDKEEPING: All maintenance records will be maintained.
REPORTING: All required emissions test reports will be submitted to appropriate agencies	TESTING: All testing requirements will be performed to ensure catalyst performance.
MONITORING: Please list and describe the process parameters and ranges that are proposed to be monitored in order to demonstrate compliance with the operation of this process equipment or air control device.	
RECORDKEEPING: Please describe the proposed recordkeeping that will accompany the monitoring.	
REPORTING: Please describe any proposed emissions testing for this process equipment on air pollution control device.	
TESTING: Please describe any proposed emissions testing for this process equipment on air pollution control device.	
31. Manufacturer's Guaranteed Control Efficiency for each air pollutant.	
32. Manufacturer's Guaranteed Control Efficiency for each air pollutant.	
33. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty.	
See NGSG operations and maintenance plan submitted with the permit application.	

ENGINE MODEL:	C-106
Rich/Lean Burn	Rich
2 or 4 Cycle	4
Bore	7.50
Stroke	8.50
Displacement (Cl.)	376
No. Cylinders	1
RPM Max/Min.	800/400
Max HP (cont.)	32
BMEP	84
BSFC (BTU/HP-HR)	10350
Exhaust Stack	
NPT Dia. (in.)	2 1/2"
Height (in.) **	*11"
Temp. (Deg. F)	1302
Flow (acfm)	213
Emissions (g/hp-hr)	
Pre-Cat Nox	14
Pre-Cat CO	11.5
Pre-Cat VOC	N/A
Pre-Cat HCHO	N/A
Post Cat Nox	*2.8
Post Cat CO	*4.8
Post Cat VOC	N/A
Post Cat HCHO	N/A
Max. Exhaust Back	20
Pressure ("W.C.)	
Weight (lb.)Dry (PU)	2690

Noble Energy, Inc. SHL 22 Production Facility

ATTACHMENT N

Supporting Emissions Calculations

Noble Energy, Inc; SHL 22 Production Facility
Tank Detail Sheet

1S-TK1-4

Source ID Number	Equipment ID	Source Location	Zone:
Tank Description	400 bbl Produced Water Tanks	Horizontal:	
Tank Usage	Produced Water Storage	Vertical:	
Tank Make		Potential operation	8,760 hr/yr
Tank Capacity	400 bbl	Potential water production	5,600 bbl/day
Serial Number		Potential water production	2,044,000 bbl/yr
Date in Service		Potential oil production*	33,726 bbl oil/yr
Tank Contents	Produced Water	Emission Factor	0.01846 lb/bbl VOC from FESCO Flash Study
Emission Controls	Vent to VDU		0.000560 lb/bbl BTEX from FESCO Flash Study
Tank Orientation	Vertical, above ground	Tank Construction	Welded (Welded, Bolted, Fiberglass)
Shell Height / Length	20 ft	Roof color & condition	Green, good (eg. light brown, good)
Shell Diameter	12 ft	FR Primary Seal	Green, good (eg. white, fair)
Roof Slope	0.06	FR Secondary Seal	N/A
Roof Type (Cone, Dome, IFR, Cone EFR, None)			N/A
Permit Status		Vent pressure setting	0.03 +/- psig
		VOC Control Efficiency	98% %
			Vent to VDU

Potential Emissions	CAS	Hrs of Operation (hrs/yr)	Estimated Uncontrolled Emissions ¹ (lb/hr)	(tpy)	(lb/yr)	Source of Emission Factor	Control
VOC-Flash		8760	4.31	18.87	37,732	FESCO Flash Study	
VOC-W&B			1.50	6.57	13,139	TANKS 4.0.9d	
Total VOC			5.81	25.44			
Total HAPs			0.734	3.214			

¹Emissions include working and breathing

*Assumes 1.65% oil in PW

Noble Energy, Inc.; SHL 22 Production Facility
Produced Water Truck Loadout

Source ID Number	2S-TL1	Location	
Source Description	Produced Water Truck Loadout	Zone	17N
Source Usage	Produced Water Truck Loadout	Easting	536119.556
		Northing	4428832.49
		Latitude	39.9957662
		Longitude	-80.560996
Potential operation	8.760		
Capture Efficiency	70%		
Control Efficiency	98%		
HAP Specification			
BTEX	2.40% wt% of VOC		Based on FESCO PW study; ratio of lb BTEX/lbbl to lb VOC/lbbl of PW
Total HAPs	20.96% wt% of VOC		

Potential Emissions		Estimated Emissions		Oil Volume (bbl/yr) ²	T of Liquid ⁵ (R)	Mol. Wt. of Vapors ⁴ (lb/lb-mol)	True VP of Liquid (psia)	EPA S Factor	Source of Emission Factor	Notes
Pollutant		(lb/1000 gal)	(lb/hr)							
VOC		10.83	0.53	33,726	530	64	12.00	0.6	AP-42 ¹	ATMOSPHERE
HAPs			0.00						AP-42 ¹	ATMOSPHERE
VOC		10.83	1.23	33,726	530	64	12.00	0.6	AP-42 ¹	To VDU
HAPs			0.00						AP-42 ¹	To VDU
VOC		10.83	0.02	33,726	530	64	12.00	0.6	AP-42 ¹	Controlled
HAPs			0.00						AP-42 ¹	Controlled

¹ EPA AP-42, Volume I, Fifth Edition - January 1995, Table 5.2-1, Saturation (S) Factors for Calculating Petroleum Liquid Loading Losses

² The oil volume for this calculation assumes that 1.65% of the produced water volume is oil.

³ EPA AP-42, Volume I, Fifth Edition - January 1995, Section 5.2.2.1.1. Assumes a minimum collection efficiency of 70%.

⁴ Molecular Weight of Vapors comes from TANKS4.0.9 run, Liquid Contents of Storage Tank table

⁵ Temperature comes from HYSYS run, "Water Out" stream

ARROW C-106

9S-GEN

32 hp

800 RPM

Fuel Heat Value

1220 Btu/scf

Heat Rate

0.3312 MMBtu/hr

Engine Heat Rate

10350 Btu/hp-hr

Control

NSCR

Pollutant	Emission Factor (lb/MMBtu)	Nominal Rating (hp)	Hrs of Operation (hrs/yr)	Estimated Emissions (lb/hr)	Source of Pollutant Emission Factor
NOx	2.80	32	8760	0.20	Mfr Factors NOx
CO	4.80	32	8760	0.34	Mfr Factors CO
VOC ²	2.96E-02	32	8760	0.01	AP-42 Ch. 3.2, table 3.2-3
CO ₂	110	32	8760	36.43	AP-42 Ch. 3.2, table 3.2-3
SOx	5.88E-04	32	8760	0.00	AP-42 Ch. 3.2, table 3.2-3
PM	9.50E-03	32	8760	0.00	AP-42 Ch. 3.2, table 3.2-3
PM ₁₀	9.50E-03	32	8760	0.00	AP-42 Ch. 3.2, table 3.2-3
Formaldehyde	2.05E-02	32	8760	0.01	AP-42 Ch. 3.2, table 3.2-3
Benzene	1.58E-03	32	8760	0.00	AP-42 Ch. 3.2, table 3.2-3
Toluene	5.58E-04	32	8760	0.00	AP-42 Ch. 3.2, table 3.2-3
Ethylbenzene	2.48E-05	32	8760	0.00	AP-42 Ch. 3.2, table 3.2-3
Xylene	1.95E-04	32	8760	0.00	AP-42 Ch. 3.2, table 3.2-3
CH ₄	0.23	32	8760	0.08	API ¹
CO ₂ e				167.91	
API Compendium of Greenhouse Gas Emissions Methodologies for the Oil and Natural Gas Industry, Table 4-9					
² Includes total hydrocarbons					
Notes					

Noble Energy, Inc; SHL 22 Production Facility
Heater Detail Sheet

Source ID Number	3S-GPU1	
Equipment ID	3S-GPU1	
SCC		
Emission Unit Description	GPU Burner	
Equipment Usage	GPU Heater	
Equipment Make	Unknown	
Equipment Model	Unknown	
Serial Number	Unknown	
Installation Date	NEW CONST.	
Emission Controls	None	
Fuel Heating Value	1200	Btu/scf
Design Heat Rate*	2.00	MMBtu/hr
Site Heat Rate*	2.00	MMBtu/hr
Potential Operation	8760	hr/yr
Potential Fuel Usage	14.60	MMscf/yr

* These are heat release rates and not the duty for the heater

Potential Emissions

Pollutant	Emission Factor (lb/MMscf)	Nominal Rating (MMBtu/hr)	Hrs of Operation (hrs/yr)	Estimated Emissions		Source of Emission Factor
				(lb/hr)	(tpy)	
NOx	100.00	2.000	8760	0.17	0.73	AP-42 ¹
CO	84.00	2.000	8760	0.14	0.61	AP-42 ¹
VOC	5.50	2.000	8760	0.01	0.04	AP-42 ²
SO2	0.60	2.000	8760	0.00	0.00	AP-42 ²
PM10	7.60	2.000	8760	0.01	0.06	AP-42 ²
Formaldehyde	0.08	2.000	8760	0.00	0.00	AP-42 ³
Total HAPs	1.89	2.000	8760	0.00315	0.01	AP-42 ³
CO ₂	120000.00	2.000	8760	200.00	876.00	AP-42 ²
CH ₄	2.30	2.000	8760	0.00	0.02	AP-42 ²
CO ₂ e					876.42	

¹ EPA AP-42, Volume I, Fifth Edition - July 1998, Table 1.4-1, Emission Factors for Nitrogen Oxides (NOx) and Carbon Monoxide (CO) from Natural Gas Combustion

² EPA AP-42, Volume I, Fifth Edition - July 1998, Table 1.4-2, Emission Factors for Criteria Pollutants and Greenhouse Gases from Natural Gas Combustion

³ EPA AP-42, Volume I, Fifth Edition - July 1998, Table 1.4-3, Emission Factors for Speciated Organic Compounds from Natural Gas Combustion

Noble Energy, Inc; SHL 22 Production Facility
Heater Detail Sheet

Source ID Number	3S-GPU2	
Equipment ID	3S-GPU2	
SCC		
Emission Unit Description	GPU Burner	
Equipment Usage	GPU Heater	
Equipment Make	Unknown	
Equipment Model	Unknown	
Serial Number	Unknown	
Installation Date	NEW CONST.	
Emission Controls	None	
Fuel Heating Value	1200	Btu/scf
Design Heat Rate*	2.00	MMBtu/hr
Site Heat Rate*	2.00	MMBtu/hr
Potential Operation	8760	hr/yr
Potential Fuel Usage	14.60	MMscf/yr

* These are heat release rates and not the duty for the heater

Potential Emissions

Pollutant	Emission Factor (lb/MMscf)	Nominal Rating (MMBtu/hr)	Hrs of Operation (hrs/yr)	Estimated Emissions		Source of Emission Factor
				(lb/hr)	(tpy)	
NOx	100.00	2.000	8760	0.17	0.73	AP-42 ¹
CO	84.00	2.000	8760	0.14	0.61	AP-42 ¹
VOC	5.50	2.000	8760	0.01	0.04	AP-42 ²
SO2	0.60	2.000	8760	0.00	0.00	AP-42 ²
PM10	7.60	2.000	8760	0.01	0.06	AP-42 ²
Formaldehyde	0.08	2.000	8760	0.00	0.00	AP-42 ³
Total HAPs	1.89	2.000	8760	0.00315	0.01	AP-42 ³
CO ₂	120000.00	2.000	8760	200.00	876.00	AP-42 ²
CH ₄	2.30	2.000	8760	0.00	0.02	AP-42 ²
CO ₂ e					876.42	

¹ EPA AP-42, Volume I, Fifth Edition - July 1998, Table 1.4-1, Emission Factors for Nitrogen Oxides (NOx) and Carbon Monoxide (CO) from Natural Gas Combustion

² EPA AP-42, Volume I, Fifth Edition - July 1998, Table 1.4-2, Emission Factors for Criteria Pollutants and Greenhouse Gases from Natural Gas Combustion

³ EPA AP-42, Volume I, Fifth Edition - July 1998, Table 1.4-3, Emission Factors for Speciated Organic Compounds from Natural Gas Combustion

Noble Energy, Inc; SHL 22 Production Facility
Heater Detail Sheet

Source ID Number	3S-GPU3	
Equipment ID	3S-GPU3	
SCC		
Emission Unit Description	GPU Burner	
Equipment Usage	GPU Heater	
Equipment Make	Unknown	
Equipment Model	Unknown	
Serial Number	Unknown	
Installation Date	NEW CONST.	
Emission Controls	None	
Fuel Heating Value	1200	Btu/scf
Design Heat Rate*	2.00	MMBtu/hr
Site Heat Rate*	2.00	MMBtu/hr
Potential Operation	8760	hr/yr
Potential Fuel Usage	14.60	MMscf/yr

* These are heat release rates and not the duty for the heater

Potential Emissions

Pollutant	Emission Factor (lb/MMscf)	Nominal Rating (MMBtu/hr)	Hrs of Operation (hrs/yr)	Estimated Emissions		Source of Emission Factor
				(lb/hr)	(tpy)	
NOx	100.00	2.000	8760	0.17	0.73	AP-42 ¹
CO	84.00	2.000	8760	0.14	0.61	AP-42 ¹
VOC	5.50	2.000	8760	0.01	0.04	AP-42 ²
SO2	0.60	2.000	8760	0.00	0.00	AP-42 ²
PM10	7.60	2.000	8760	0.01	0.06	AP-42 ²
Formaldehyde	0.08	2.000	8760	0.00	0.00	AP-42 ³
Total HAPs	1.89	2.000	8760	0.00315	0.01	AP-42 ³
CO ₂	120000.00	2.000	8760	200.00	876.00	AP-42 ²
CH ₄	2.30	2.000	8760	0.00	0.02	AP-42 ²
CO ₂ e					876.42	

¹ EPA AP-42, Volume I, Fifth Edition - July 1998, Table 1.4-1, Emission Factors for Nitrogen Oxides (NOx) and Carbon Monoxide (CO) from Natural Gas Combustion

² EPA AP-42, Volume I, Fifth Edition - July 1998, Table 1.4-2, Emission Factors for Criteria Pollutants and Greenhouse Gases from Natural Gas Combustion

³ EPA AP-42, Volume I, Fifth Edition - July 1998, Table 1.4-3, Emission Factors for Speciated Organic Compounds from Natural Gas Combustion

Noble Energy, Inc; SHL 22 Production Facility
Heater Detail Sheet

Source ID Number	3S-GPU4	
Equipment ID	3S-GPU4	
SCC		
Emission Unit Description	GPU Burner	
Equipment Usage	GPU Heater	
Equipment Make	Unknown	
Equipment Model	Unknown	
Serial Number	Unknown	
Installation Date	NEW CONST.	
Emission Controls	None	
Fuel Heating Value	1200	Btu/scf
Design Heat Rate*	2.00	MMBtu/hr
Site Heat Rate*	2.00	MMBtu/hr
Potential Operation	8760	hr/yr
Potential Fuel Usage	14.60	MMscf/yr

* These are heat release rates and not the duty for the heater

Potential Emissions

Pollutant	Emission Factor (lb/MMscf)	Nominal Rating (MMBtu/hr)	Hrs of Operation (hrs/yr)	Estimated Emissions		Source of Emission Factor
				(lb/hr)	(tpy)	
NOx	100.00	2.000	8760	0.17	0.73	AP-42 ¹
CO	84.00	2.000	8760	0.14	0.61	AP-42 ¹
VOC	5.50	2.000	8760	0.01	0.04	AP-42 ²
SO2	0.60	2.000	8760	0.00	0.00	AP-42 ²
PM10	7.60	2.000	8760	0.01	0.06	AP-42 ²
Formaldehyde	0.08	2.000	8760	0.00	0.00	AP-42 ³
Total HAPs	1.89	2.000	8760	0.00315	0.01	AP-42 ³
CO ₂	120000.00	2.000	8760	200.00	876.00	AP-42 ²
CH ₄	2.30	2.000	8760	0.00	0.02	AP-42 ²
CO ₂ e					876.42	

¹ EPA AP-42, Volume I, Fifth Edition - July 1998, Table 1.4-1, Emission Factors for Nitrogen Oxides (NOx) and Carbon Monoxide (CO) from Natural Gas Combustion

² EPA AP-42, Volume I, Fifth Edition - July 1998, Table 1.4-2, Emission Factors for Criteria Pollutants and Greenhouse Gases from Natural Gas Combustion

³ EPA AP-42, Volume I, Fifth Edition - July 1998, Table 1.4-3, Emission Factors for Speciated Organic Compounds from Natural Gas Combustion

**Noble Energy, Inc; SHL 22 Production Facility
Heater Detail Sheet**

Source ID Number	3S-GPU5	
Equipment ID	3S-GPU5	
SCC		
Emission Unit Description	GPU Burner	
Equipment Usage	GPU Heater	
Equipment Make	Unknown	
Equipment Model	Unknown	
Serial Number	Unknown	
Installation Date	NEW CONST.	
Emission Controls	None	
Fuel Heating Value	1200	Btu/scf
Design Heat Rate*	2.00	MMBtu/hr
Site Heat Rate*	2.00	MMBtu/hr
Potential Operation	8760	hr/yr
Potential Fuel Usage	14.60	MMscf/yr

* These are heat release rates and not the duty for the heater

Potential Emissions

Pollutant	Emission Factor (lb/MMscf)	Nominal Rating (MMBtu/hr)	Hrs of Operation (hrs/yr)	Estimated Emissions		Source of Emission Factor
				(lb/hr)	(tpy)	
NOx	100.00	2.000	8760	0.17	0.73	AP-42 ¹
CO	84.00	2.000	8760	0.14	0.61	AP-42 ¹
VOC	5.50	2.000	8760	0.01	0.04	AP-42 ²
SO2	0.60	2.000	8760	0.00	0.00	AP-42 ²
PM10	7.60	2.000	8760	0.01	0.06	AP-42 ²
Formaldehyde	0.08	2.000	8760	0.00	0.00	AP-42 ³
Total HAPs	1.89	2.000	8760	0.00315	0.01	AP-42 ³
CO ₂	120000.00	2.000	8760	200.00	876.00	AP-42 ²
CH ₄	2.30	2.000	8760	0.00	0.02	AP-42 ²
CO ₂ e					876.42	

¹ EPA AP-42, Volume I, Fifth Edition - July 1998, Table 1.4-1, Emission Factors for Nitrogen Oxides (NOx) and Carbon Monoxide (CO) from Natural Gas Combustion

² EPA AP-42, Volume I, Fifth Edition - July 1998, Table 1.4-2, Emission Factors for Criteria Pollutants and Greenhouse Gases from Natural Gas Combustion

³ EPA AP-42, Volume I, Fifth Edition - July 1998, Table 1.4-3, Emission Factors for Speciated Organic Compounds from Natural Gas Combustion

Noble Energy, Inc; SHL 22 Production Facility
Heater Detail Sheet

Source ID Number	3S-GPU6	
Equipment ID	3S-GPU6	
SCC		
Emission Unit Description	GPU Burner	
Equipment Usage	GPU Heater	
Equipment Make	Unknown	
Equipment Model	Unknown	
Serial Number	Unknown	
Installation Date	NEW CONST.	
Emission Controls	None	
Fuel Heating Value	1200	Btu/scf
Design Heat Rate*	2.00	MMBtu/hr
Site Heat Rate*	2.00	MMBtu/hr
Potential Operation	8760	hr/yr
Potential Fuel Usage	14.60	MMscf/yr

* These are heat release rates and not the duty for the heater

Potential Emissions

Pollutant	Emission Factor (lb/MMscf)	Nominal Rating (MMBtu/hr)	Hrs of Operation (hrs/yr)	Estimated Emissions		Source of Emission Factor
				(lb/hr)	(tpy)	
NOx	100.00	2.000	8760	0.17	0.73	AP-42 ¹
CO	84.00	2.000	8760	0.14	0.61	AP-42 ¹
VOC	5.50	2.000	8760	0.01	0.04	AP-42 ²
SO2	0.60	2.000	8760	0.00	0.00	AP-42 ²
PM10	7.60	2.000	8760	0.01	0.06	AP-42 ²
Formaldehyde	0.08	2.000	8760	0.00	0.00	AP-42 ³
Total HAPs	1.89	2.000	8760	0.00315	0.01	AP-42 ³
CO ₂	120000.00	2.000	8760	200.00	876.00	AP-42 ²
CH ₄	2.30	2.000	8760	0.00	0.02	AP-42 ²
CO ₂ e					876.42	

¹ EPA AP-42, Volume I, Fifth Edition - July 1998, Table 1.4-1, Emission Factors for Nitrogen Oxides (NOx) and Carbon Monoxide (CO) from Natural Gas Combustion

² EPA AP-42, Volume I, Fifth Edition - July 1998, Table 1.4-2, Emission Factors for Criteria Pollutants and Greenhouse Gases from Natural Gas Combustion

³ EPA AP-42, Volume I, Fifth Edition - July 1998, Table 1.4-3, Emission Factors for Speciated Organic Compounds from Natural Gas Combustion

**Noble Energy, Inc; SHL 22 Production Facility
Heater Detail Sheet**

Source ID Number	3S-GPU7	
Equipment ID	3S-GPU7	
SCC		
Emission Unit Description	GPU Burner	
Equipment Usage	GPU Heater	
Equipment Make	Unknown	
Equipment Model	Unknown	
Serial Number	Unknown	
Installation Date	NEW CONST.	
Emission Controls	None	
Fuel Heating Value	1200	Btu/scf
Design Heat Rate*	2.00	MMBtu/hr
Site Heat Rate*	2.00	MMBtu/hr
Potential Operation	8760	hr/yr
Potential Fuel Usage	14.60	MMscf/yr

* These are heat release rates and not the duty for the heater

Potential Emissions

Pollutant	Emission Factor (lb/MMscf)	Nominal Rating (MMBtu/hr)	Hrs of Operation (hrs/yr)	Estimated Emissions		Source of Emission Factor
				(lb/hr)	(tpy)	
NOx	100.00	2.000	8760	0.17	0.73	AP-42 ¹
CO	84.00	2.000	8760	0.14	0.61	AP-42 ¹
VOC	5.50	2.000	8760	0.01	0.04	AP-42 ²
SO2	0.60	2.000	8760	0.00	0.00	AP-42 ²
PM10	7.60	2.000	8760	0.01	0.06	AP-42 ²
Formaldehyde	0.08	2.000	8760	0.00	0.00	AP-42 ³
Total HAPs	1.89	2.000	8760	0.00315	0.01	AP-42 ³
CO ₂	120000.00	2.000	8760	200.00	876.00	AP-42 ²
CH ₄	2.30	2.000	8760	0.00	0.02	AP-42 ²
CO ₂ e					876.42	

¹ EPA AP-42, Volume I, Fifth Edition - July 1998, Table 1.4-1, Emission Factors for Nitrogen Oxides (NOx) and Carbon Monoxide (CO) from Natural Gas Combustion

² EPA AP-42, Volume I, Fifth Edition - July 1998, Table 1.4-2, Emission Factors for Criteria Pollutants and Greenhouse Gases from Natural Gas Combustion

³ EPA AP-42, Volume I, Fifth Edition - July 1998, Table 1.4-3, Emission Factors for Speciated Organic Compounds from Natural Gas Combustion

Noble Energy, Inc; SHL 22 Production Facility
Heater Detail Sheet

Source ID Number	3S-GPU8	
Equipment ID	3S-GPU8	
SCC		
Emission Unit Description	GPU Burner	
Equipment Usage	GPU Heater	
Equipment Make	Unknown	
Equipment Model	Unknown	
Serial Number	Unknown	
Installation Date	NEW CONST.	
Emission Controls	None	
Fuel Heating Value	1200	Btu/scf
Design Heat Rate*	2.00	MMBtu/hr
Site Heat Rate*	2.00	MMBtu/hr
Potential Operation	8760	hr/yr
Potential Fuel Usage	14.60	MMscf/yr

* These are heat release rates and not the duty for the heater

Potential Emissions

Pollutant	Emission Factor (lb/MMscf)	Nominal Rating (MMBtu/hr)	Hrs of Operation (hrs/yr)	Estimated Emissions		Source of Emission Factor
				(lb/hr)	(tpy)	
NOx	100.00	2.000	8760	0.17	0.73	AP-42¹
CO	84.00	2.000	8760	0.14	0.61	AP-42¹
VOC	5.50	2.000	8760	0.01	0.04	AP-42²
SO2	0.60	2.000	8760	0.00	0.00	AP-42²
PM10	7.60	2.000	8760	0.01	0.06	AP-42²
Formaldehyde	0.08	2.000	8760	0.00	0.00	AP-42³
Total HAPs	1.89	2.000	8760	0.00315	0.01	AP-42³
CO ₂	120000.00	2.000	8760	200.00	876.00	AP-42²
CH ₄	2.30	2.000	8760	0.00	0.02	AP-42²
CO ₂ e					876.42	

¹ EPA AP-42, Volume I, Fifth Edition - July 1998, Table 1.4-1, Emission Factors for Nitrogen Oxides (NOx) and Carbon Monoxide (CO) from Natural Gas Combustion

² EPA AP-42, Volume I, Fifth Edition - July 1998, Table 1.4-2, Emission Factors for Criteria Pollutants and Greenhouse Gases from Natural Gas Combustion

³ EPA AP-42, Volume I, Fifth Edition - July 1998, Table 1.4-3, Emission Factors for Speciated Organic Compounds from Natural Gas Combustion

Noble Energy, Inc; SHL 22 Production Facility
Enclosed Flare Detail Sheet

Source ID Number					
Equipment ID	4S-COMB1		Truck Loading VOC Emissions & Flash VRU downtime		
Equipment Usage	Vapor Combustor		Produced Water Tanks	25.44 tpy VOC	3.21 tpy HAPs
			Produced Water Loading	5.37 tpy VOC	1.13 tpy HAPs
Equipment Make	Leed		Total VOC Emissions	30.81 tpy	4.34 tpy HAPs
Equipment Model	LDF1350 Dual Stage Combustor		Control Efficiency	98%	98%
Serial Number	Unknown		Controlled VOC Emissions	0.62 tpy	0.09 tpy HAPs
Installation Date	02/01/17		Combustion		
Emission Controls	None		Molecular Weight of Vapors	lb/lb-mol	
Pilot			Fuel Heating Value	1950 Btu/scf	
Fuel Heating Value	1200	Btu/scf	Potential Heat Output	11,700 MMBtu/hr	
Design Heat Rate	0.02	MMBtu/hr	VOC Vapors sent to flare	61613.0 lbs/yr	
Site Heat Rate	0.02	MMBtu/hr	Potential Operation	365 days/yr	
Potential Operation	365	days/yr	Ave. Gas Flared	144,000 Mscf/day	
Potential Fuel Usage	0.30	Mscf/day			

9S-PILOT1

Combustor Pilot Emissions

Pollutant	Emission Factor lb/MMSCF	Annual gas Usage MMSCF/yr	Hrs of Operation (hrs/yr)	Estimated Emissions		Source of Emission Factor
				(lb/hr)	Pilot tpy	
NOx	100.000	0.11	8760	0.00	0.01	AP-42 ²
CO	84.000	0.11	8760	0.00	0.005	AP-42 ²
PM10	7.600	0.11	8760	0.00	0.00	AP-42 ²
VOC	5.500	0.11	8760	0.00	0.00	AP-42 ²
N ₂ O	1.000	0.11	8760	0.00	0.00	API
CO ₂	120000.000	0.11	8760	1.50	6.57	AP-42 ²

Potential Combustion Emissions

Pollutant	Emission Factor lb/MMBtu	Annual gas Usage MMBtu/yr	Estimated Emissions tpy	Emission Factor Source
NOx	0.068	102492.00	3.48	AP-42 ¹
CO	0.370	102492.00	18.96	AP-42 ¹
N ₂ O	0.001	102492.00	0.05	API
CO ₂	117.650	102492.00	6029.09	AP-42 ¹

Total Potential Vapor Combustor Emissions

Pollutant	tpy	lb/hr
NOx	3.49	0.80
CO	18.97	4.33
PM10	0.00	0.00
VOC	0.62	0.14
HAPs	0.09	0.02
N ₂ O	0.05	0.01
CO ₂	6035.66	1378.01
CO ₂ e	6051.31	1381.58

¹ EPA AP-42, Volume I, Fifth Edition - September 1991, Table 13.5-1, Emission Factors for Flare Operations.

² EPA AP-42, Volume I, Fifth Edition - September 1991, Table 1.4, Emission Factors for Natural Gas Combustion

**Noble Energy, Inc; SHL 22 Production Facility
Fuel Cell**

Source ID Number	8S-FC	
Equipment ID	8S-FC	
Equipment Usage	Remote Power System	
Equipment Make	Acumentrics	
Equipment Model	Propane	
Serial Number	TBD	
Installation Date	NEW CONST.	
Emission Controls	None	
Fuel Heating Value	91600	Btu/gal
Design Heat Rate*	5496	Btu/hr
Site Heat Rate*	0.005496	MMBtu/hr
Potential Operation	8760	hr/yr
Potential Fuel Usage	1.44	gal/day

Potential Emissions

Pollutant	Emission Factor (lb/10 ³ gal)	Hrs of Operation (hrs/yr)	Estimated Emissions		Source of Emission Factor
			(lb/hr)	(tpy)	
NOx	13.00	8760	7.80E-04	0.00	AP-42 ¹
CO	7.50	8760	4.50E-04	0.00	AP-42 ¹
VOC	1.00	8760	6.00E-05	0.00	AP-42 ¹
SO2	0.10	8760	6.00E-06	0.00	AP-42 ¹
PM10	0.70	8760	4.20E-05	0.00	AP-42 ¹
CO ₂	12500.00	8760	7.50E-01	3.29	AP-42 ¹
CH ₄	0.20	8760	1.20E-05	0.00	AP-42 ¹
CO ₂ e				3.29	

¹ EPA AP-42, Volume I, Fifth Edition - July 2008, Table 1.5-1, Emission Factors for LPG Combustion

Noble Energy, Inc; SHL 22 Production Facility

Flare Detail Sheet

Source ID Number	6S-FL				
Equipment ID	6C-FL				
Equipment Usage	Unloading Vessel Control Sandpiper Diaphragm Pump Control	Unloading Vessel Diaphragm Pump	VOC 165.84 tpy 1.44 tpy	HAPs 12.1670034 tpy 0.11 tpy	
Equipment Make	NOV	Total Emissions	167.27 tpy UNCONTROLLED	12.27 tpy UNCONTROLLED	
Equipment Model	Produced Gas Flare	Control Efficiency	908.95 lb/hr UNCONTROLLED	68.69 lb/hr UNCONTROLLED	
Serial Number	Unknown	Controlled Emissions	98%	98%	
Installation Date	02/01/17		3.35 tpy CONTROLLED	0.25 tpy CONTROLLED	
Pilot			18.18 lb/hr CONTROLLED	1.33 lb/hr CONTROLLED	
Fuel Heating Value	1220 Btu/scf	Fuel Heating Value	1150 Btu/scf		
Design Heat Rate	0.26 MMBtu/hr	Potential Heat Output	74.727 MMBtu/hr		
Site Heat Rate	0.26 MMBtu/hr	VOC Vapors sent to flare	334546.0 lbs/yr		
Potential Operation	365 days/yr	Potential Operation	15.20 days/yr		
Potential Fuel Usage	5.19 Mscf/day	MAX. Gas Flared	1559.520 Mscf/day		

Flare Pilot Emissions

Pollutant	Emission Factor lb/MMSCF	Annual gas Usage MMSCF/yr	Hrs of Operation (hrs/yr)	Estimated Emissions		Source of Emission Factor
				(lb/hr)	Pilot tpy	
NOx	100.000	1.90	8760	0.02	0.09	AP-42 ²
CO	84.000	1.90	8760	0.02	0.08	AP-42 ²
PM10	7.600	1.90	8760	0.00	0.01	AP-42 ²
VOC	5.500	1.90	8760	0.03	0.01	AP-42 ²
N ₂ O	1.000	1.90	8760	0.00	0.00	API
CO ₂	120000.000	1.90	8760	25.97	113.74	AP-42 ²

Unloading Vessel Emissions

Pollutant	Emission Factor lb/MMBtu	Usage MMBtu/hr	Hrs of Operation (hrs/yr)	Estimated Emissions lb/hr	Estimated Emissions tpy	Emission Factor Source
NOx	0.068	74.73	365	5.08	0.93	AP-42 ¹
CO	0.370	74.73	365	27.65	5.04	AP-42 ¹
N ₂ O	0.001	74.73	365	0.08	0.01	API
CO ₂	117.650	74.73	365	8791.63	1604.02	AP-42 ¹

Sandpiper Diaphragm Pump Emissions

Pollutant	Emission Factor lb/MMBtu	Usage MMBtu/hr	Hrs of Operation (hrs/yr)	Estimated Emissions lb/hr	Estimated Emissions tpy	Emission Factor Source
NOx	0.068	1.46	365	0.10	0.02	AP-42 ¹
CO	0.370	1.46	365	0.54	0.10	AP-42 ¹
N ₂ O	0.001	1.46	365	0.00	0.00	API
CO ₂	117.650	1.46	365	172.24	31.42	AP-42 ¹

Total Potential Vapor Combustor Emissions

Pollutant	tpy	lb/hr
NOx	1.04	5.20
CO	5.22	28.21
PM10	0.01	0.00
VOC	3.35	18.34
HAPs	0.25	1.35
N ₂ O	0.02	0.08
CH ₄	18.08	4.13
CO ₂	1749.18	6889.84
CO ₂ e	2205.67	9116.33

¹ EPA AP-42, Volume I, Fifth Edition - September 1991, Table 13.5-1, Emission Factors for Flare Operations.

² EPA AP-42, Volume I, Fifth Edition - September 1991, Table 1.4, Emission Factors for Natural Gas Combustion

Noble Energy, Inc; SHL 22 Production Facility
Pump Detail Sheet

Source ID Number	10S-Pump	
Equipment ID	Sandpiper Diaphragm Pump	
Equipment Usage	Unloading Vessel Fluid Transfer	
Equipment Make	Sandpiper	
Equipment Model	G20	
Serial Number	Unknown	
Installation Date	02/01/17	
Pilot		
Design Rate	20.00	scf/min
Potential Operation	365	hours/yr
Control Efficiency	98.00%	%

Potential Emissions

Pollutant	Estimated Uncontrolled Emissions			Source of	
	wt frac	(lb/hr)	(tpy)	Emission Factor	Control
VOC	1.28E-01	7.87	1.44	HYSYS	6C-FL
Benzene	4.43E-05	0.00	0.00	HYSYS	6C-FL
Toluene	1.05E-04	0.01	0.00	HYSYS	6C-FL
Ethylbenzene	9.96E-06	0.00	0.00	HYSYS	6C-FL
Xylene	6.58E-05	0.00	0.00	HYSYS	6C-FL
n-Hexane	9.18E-03	0.56	0.10	HYSYS	6C-FL
Total HAPs		0.577	0.105	HYSYS	6C-FL
CH4	6.92E-01	42.463	7.747	HYSYS	6C-FL

Controlled Emissions

Pollutant	Estimated Controlled Emissions		Source of	
	(lb/hr)	(tpy)	Emission Factor	Control
VOC	0.16	0.03	HYSYS	6C-FL
Benzene	0.00	0.00	HYSYS	6C-FL
Toluene	0.00	0.00	HYSYS	6C-FL
Ethylbenzene	0.00	0.00	HYSYS	6C-FL
Xylene	0.00	0.00	HYSYS	6C-FL
n-Hexane	0.01	0.00	HYSYS	6C-FL
Total HAPs	0.01	0.00	HYSYS	6C-FL
CH4	0.85	0.15	HYSYS	6C-FL

**Noble Energy, Inc. SHL 22 Production Facility
Pneumatic Controllers**

Equipment ID	11S-FC1-8, 11S-BP	
Equipment Usage	Flow Control / Back Pressure	
Equipment Make	Fischer Control	
Equipment Model	DVC 6200	
Emission Controls	None	
Equipment Count	9	
Design Flow*	6.00	SCFH
Potential Operation	8760	hr/yr
Service	NG	

Equipment ID	11S-LC1-16	
Equipment Usage	Separator Level Control	
Equipment Make	KIMRAY	
Equipment Model	GEN II level Controllers	
Emission Controls	None	
Equipment Count	16	
Design Flow*	0.02	SCFH
Potential Operation	8760	hr/yr
Service	NG	

Potential Emissions 11S-FC1-8

Pollutant	% of VOC	Emission Factor (lb/SCF)	Hrs of Operation (hrs/yr)	Estimated Emissions		Source of Emission Factor
				(lb/hr)	(tpy)	
VOC		0.05	8760	2.46	10.76	Gas Analysis
n-Hexane	7.80E-02			0.19	0.84	HYSYS % of VOC
Benzene	1.70E-04			0.00	0.00	HYSYS % of VOC
Toluene	7.23E-04			0.00	0.01	HYSYS % of VOC
Ethylbenzene	9.26E-05			0.00	0.00	HYSYS % of VOC
Xylenes	6.95E-04			0.00	0.01	HYSYS % of VOC
Total HAPs	7.34E-02		8760	0.20	0.86	HYSYS % of VOC
CH4	5.40E+00			13.25	58.04	HYSYS % of VOC

Potential Emissions 11S-BP

Pollutant	% of VOC	Emission Factor (lb/SCF)	Hrs of Operation (hrs/yr)	Estimated Emissions		Source of Emission Factor
				(lb/hr)	(tpy)	
VOC		0.05	8760	0.31	1.34	Gas Analysis
n-Hexane	7.80E-02			0.02	0.10	HYSYS % of VOC
Benzene	1.70E-04			0.00	0.00	HYSYS % of VOC
Toluene	7.23E-04			0.00	0.00	HYSYS % of VOC
Ethylbenzene	9.26E-05			0.00	0.00	HYSYS % of VOC
Xylenes	6.95E-04			0.00	0.00	HYSYS % of VOC
Total HAPs	7.34E-02		8760	0.02	0.11	HYSYS % of VOC
CH4	5.40E+00			1.66	7.25	HYSYS % of VOC

Potential Emissions 11S-LC1-16

Pollutant	% of VOC	Emission Factor (lb/SCF)	Hrs of Operation (hrs/yr)	Estimated Emissions		Source of Emission Factor
				(lb/hr)	(tpy)	
VOC		0.05	8760	0.01	0.06	Gas Analysis
n-Hexane	7.80E-02			0.19	0.00	HYSYS % of VOC
Benzene	1.70E-04			0.00	0.00	HYSYS % of VOC
Toluene	7.23E-04			0.00	0.00	HYSYS % of VOC
Ethylbenzene	9.26E-05			0.00	0.00	HYSYS % of VOC
Xylenes	6.95E-04			0.00	0.00	HYSYS % of VOC
Total HAPs	7.34E-02		8760	0.20	0.00	HYSYS % of VOC
CH4	5.40E+00			0.07	0.32	HYSYS % of VOC

Noble Energy, Inc. SHL 22 Production Facility
FESCO, Ltd.
1100 Fesco Ave. - Alice, Texas 78332

For: Noble Energy, Inc.
1625 Broadway, Suite 2200
Denver, Colorado 80202

Sample: Sand Hill 8J
Gas Liberated from Separator Water
From 560 psig & 70 °F to 0 psig & 70 °F

Date Sampled: 05/08/2014 Job Number: 43289.011

CHROMATOGRAPH EXTENDED ANALYSIS - SUMMATION REPORT - GPA 2286

COMPONENT	MOL %	GPM
Hydrogen Sulfide*	0.004	
Nitrogen	#	
Carbon Dioxide	1.868	
Methane	#	
Ethane	#	2.744
Propane	1.849	0.513
Isobutane	0.214	0.071
n-Butane	0.477	0.152
2-2 Dimethylpropane	0.000	0.000
Isopentane	0.221	0.081
n-Pentane	0.186	0.068
Hexanes	0.450	0.187
Heptanes Plus	1.037	0.470
Totals	#	4.286

Computed Real Characteristics Of Heptanes Plus:

Specific Gravity 3.650 (Air=1)
Molecular Weight 105.41
Gross Heating Value 5592 BTU/CF

Computed Real Characteristics Of Total Sample:

Specific Gravity 0.757 (Air=1)
Compressibility (Z) 0.9970
Molecular Weight 21.85
Gross Heating Value
Dry Basis 1069 BTU/CF
Saturated Basis 1051 BTU/CF

*Hydrogen Sulfide tested in laboratory by: Stained Tube Method (GPA 2377)
Results: <0.013 Gr/100 CF, <0.2 PPMV or <0.001 Mol %

Base Conditions: 14.850 PSI & 60 Deg F

Certified: FESCO, Ltd. - Alice, Texas
Analyst: MR
Processor: djv
Cylinder ID: WF-2s David Dannhaus 361-661-7015

FESCO, Ltd.

Job Number:
43289.011CHROMATOGRAPH EXTENDED ANALYSIS TOTAL REPORT -
GPA 2286

COMPONENT	MO L %	GPM	WT %
Hydrogen Sulfide*	< 0.001		< 0.001
Nitrogen	13.188		16.907
Carbon Dioxide	1.868		3.762
Methane	70.329		51.632
Ethane	10.181	2.744	14.009
Propane	1.849	0.513	3.731
Isobutane	0.214	0.071	0.569
n-Butane	0.477	0.152	1.269
2,2 Dimethylpropane	0.000	0.000	0.000
Isopentane	0.221	0.081	0.730
n-Pentane	0.186	0.068	0.614
2,2 Dimethylbutane	0.018	0.008	0.071
Cyclopentane	0.000	0.000	0.000
2,3 Dimethylbutane	0.029	0.012	0.114
2 Methylpentane	0.131	0.055	0.517
3 Methylpentane	0.089	0.037	0.351
n-Hexane	0.183	0.076	0.722
Methylcyclopentane	0.020	0.007	0.077
Benzene	0.025	0.007	0.089
Cyclohexane	0.033	0.011	0.127
2-Methylhexane	0.085	0.040	0.390
3-Methylhexane	0.088	0.040	0.404
2,2,4 Trimethylpentane	0.000	0.000	0.000
Other C7's	0.082	0.036	0.372
n-Heptane	0.125	0.058	0.573
Methylcyclohexane	0.092	0.037	0.413
Toluene	0.042	0.014	0.177
Other C8's	0.203	0.095	1.024
n-Octane	0.066	0.034	0.345
Ethylbenzene	0.002	0.001	0.010
M & P Xylenes	0.026	0.010	0.126
O-Xylene	0.003	0.001	0.015
Other C9's	0.095	0.049	0.549
n-Nonane	0.020	0.011	0.117
Other C10's	0.026	0.015	0.168
n-Decane	0.004	0.002	0.026
Undecanes (11)	0.000	0.000	0.000
Totals	100.000	4.286	100.000

Computed Real Characteristics Of Total Sample:

Specific Gravity 0.757 (Air=1)

Compressibility (Z) 0.9970

Molecular Weight 21.85

Gross Heating Value

Dry Basis 1069 BTU/CF

Saturated Basis 1051 BTU/CF

Noble Energy, Inc. SHL 22 Production Facility

Stream #	Description	1	2	3	4	5
		Well Fluid to Sand Separator	Well Fluid to GPU Separator	Produced Gas to Sales Pipeline	Water to Tanks	Condensate to Pipeline
	Unit					
Vapor Fraction		0.750	0.738	1.000	0.000	0.000
Temperature	F	79.1	70.0	70.0	70.0	70.0
Pressure	psig	2000	500	500	500	500
Vapor Flow	MMSCFD	36.058	36.058	26.610	-	-
Mass Flow	lb/hr	143349	143349	56726	81628	4996
Liquid Flow	barrel/day	17938	17938	11788	5600	550
Component Mass Fractions						
Methane		0.4977	0.4977	0.6916	0.0000	0.0335
Ethane		0.1257	0.1257	0.1719	0.0000	0.0394
Propane		0.0488	0.0488	0.0640	0.0000	0.0461
i-Butane		0.0089	0.0089	0.0108	0.0000	0.0178
n-Butane		0.0176	0.0176	0.0205	0.0000	0.0462
i-Pentane		0.0079	0.0079	0.0076	0.0000	0.0388
n-Pentane		0.0121	0.0121	0.0107	0.0000	0.0710
n-Hexane		0.0174	0.0174	0.0092	0.0000	0.1719
n-Heptane		0.0123	0.0123	0.0031	0.0000	0.1590
n-Octane		0.0125	0.0125	0.0013	0.0000	0.1822
n-Nonane		0.0053	0.0053	0.0002	0.0000	0.0815
n-Decane		0.0023	0.0023	0.0000	0.0000	0.0359
C10+*		0.0029	0.0029	0.0001	0.0000	0.0458
Nitrogen		0.0036	0.0036	0.0050	0.0000	0.0001
CO2		0.0018	0.0018	0.0024	0.0000	0.0003
Oxygen		0.0001	0.0001	0.0001	0.0000	0.0000
H2O		0.2209	0.2209	0.0007	1.0000	0.0001
Benzene		0.0001	0.0001	0.0000	0.0000	0.0009
Toluene		0.0005	0.0005	0.0001	0.0000	0.0063
E-Benzene		0.0001	0.0001	0.0000	0.0000	0.0017
o-Xylene		0.0009	0.0009	0.0001	0.0000	0.0134
Cyclohexane		0.0007	0.0007	0.0003	0.0000	0.0080



ARROW GENSET

CONTINUOUS CATHODIC PROTECTION



ARROW GENSET

CONTINUOUS CATHODIC PROTECTION

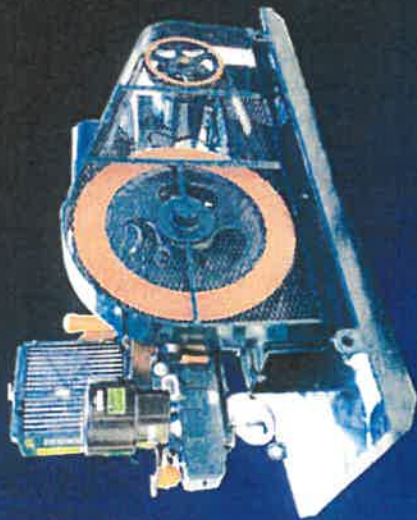
WHAT IS CATHODIC PROTECTION?

Cathodic Protection is providing an electrical current to reduce corrosion of metal structures in soil. Gas and oil professionals around the world know that corrosion is a real concern. If the countless miles of pipeline were not protected, the threat of leakage or failure would be greatly increased.

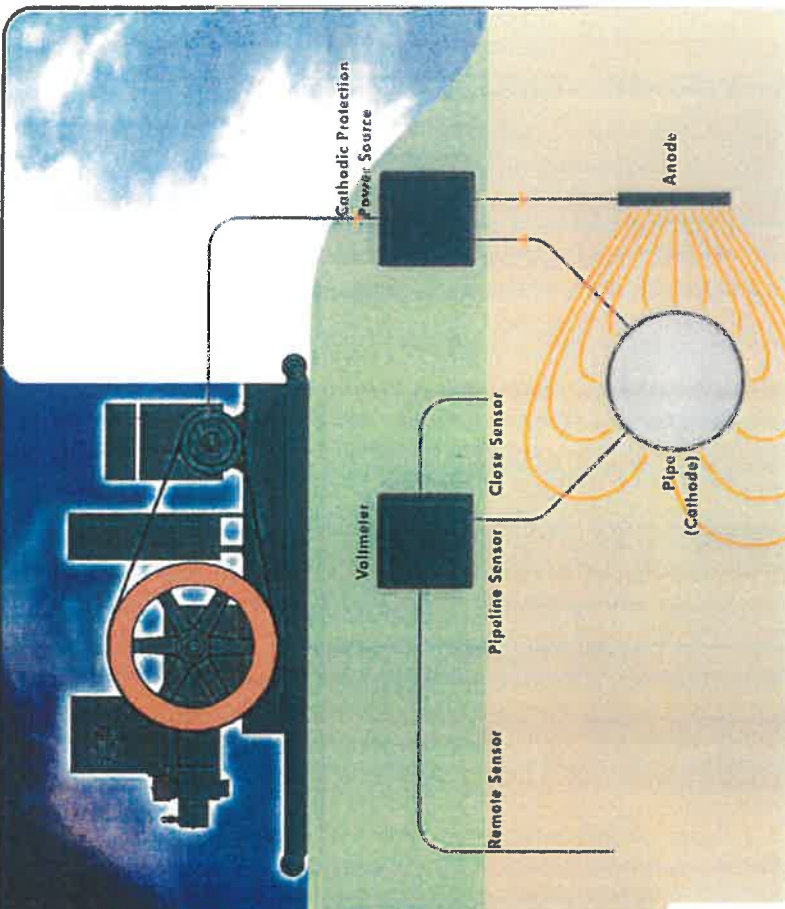
In the United States, the D.O.T. Office of Pipeline Safety states that pipelines operating at certain pressures must have cathodic protection installed. In the corrosion process, minute metal particles are carried from the pipeline by a natural current flow, which causes pitting that weakens the pipeline and could result in leakage or pipeline failure. The installation of a cathodic protection system reduces or eliminates corrosion.

ARROW HAS THE ANSWER

The Arrow Engine Company has a solution to the problem of cathodic protection for remote site locations along gas pipelines. Arrow single cylinder generators "the Arrow GENSET" can be strategically placed along the pipeline, using pipeline natural gas to fuel the GENSET, generating the D.C. current onto the pipeline structure. This process of cathodic protection reduces the deterioration of pipelines that carry millions of cubic feet of gas daily.



C-46 GENSET-AC 5KW



Engine Model	Output	Engine RPM	Alternator RPM	Fuel Required
C-46 GENSET-AC	5kw	700	1800	2.2 MCF/D
C-46 GENSET-DC	5kw	700	1800	2.2 MCF/D
C-66 GENSET-AC	7.5kw	600	1800	3.0 MCF/D
C-96 GENSET-AC	15kw	600	1800	4.7 MCF/D
C-106 GENSET-AC	25kw	700	1800	8.2 MCF/D
C-255 GENSET-AC	38kw	900	900	14.5 MCF/D
L-795 GENSET-AC	45kw	500	1800	15 MCF/D

Arrow Engine Company
2301 E. Independence
Tulsa, OK 74110
TOLL FREE
800.331.3662
Local 918.383.3711
Fax 918.383.3204
Copyright March 2009

Check for the latest prices, catalog, and specifications at
www.arrowengine.com

CURRENTLY IN USE

One user of the Arrow GENSET is located near Brookville, Pennsylvania and has 50 percent of the 720 miles of pipeline in this system that requires cathodic protection.

A location using an Arrow GENSET recorded more than 66,000 hours of operation on Unit 1 and commented that in this time not one bolt had ever been removed from the unit. Operators with the company stated that they have experienced exceptional results from the Arrow GENSET, with negligible down time. Initially they used 1/3 of the unit's capacity, and planned to extend the protection range of the unit.

LEARN MORE

As that eastern United States gas transmission company found, the Arrow GENSET is a quality cathodic protection unit for remote areas. For more information call the Arrow Engine Company Customer Service Department at 1 800 331 3662 or visit us at www.arrowengine.com; click on the testimonial tab to view user comments about operation of the Arrow Slow Speed GENSETS and other Arrow Engine Power Products.

RP250/RP500*

250/500W NATURAL GAS OR PROPANE FUELED REMOTE POWER SYSTEM



The RP Series of high efficiency, natural gas or propane fueled Remote Power Systems are based on fuel cell technology developed by Acumentrics and is an excellent option for supply of DC Power to several Off Grid application areas:

- **Natural Gas Pipeline & Wellhead**
 - Cathodic Protection
 - SCADA
 - RCVs
 - Chemical Injection Pumps
- **Remote Surveillance**
 - Cameras
 - Routers
 - Sensors
 - Alarm systems
- **Chemical Detection Power**
 - Gas Analyzers
 - Radiation detectors
- **Off Grid Telecom**
 - Cellular Base stations
 - Radio Transmitters
 - Microwave Repeaters
- **Wind Energy Assessment**
 - LIDAR
 - SODAR
 - Meteorological Tower Heating/Lighting

Reliable, Low Maintenance Operation

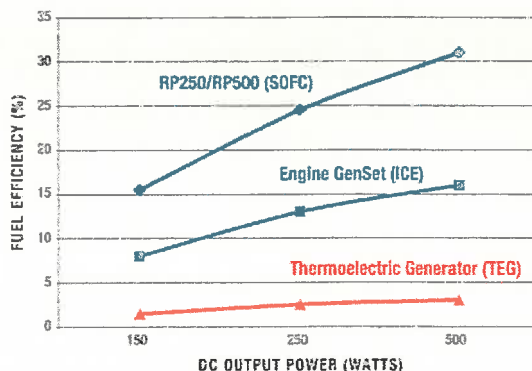
The core of the RP is a solid state, ceramic tubular fuel cell. The system has few moving parts with no motor oil, coolant or hydraulic fluids to change or potentially spill. The system is compact, easy to install. Standard maintenance is an annual site visit to change air and fuel filters. It's scalable and modular so install only as much power as needed, with the option to add more as required.

Efficient

The RP fuel cell electrochemically converts a fuel's energy directly into DC electric power. It consumes natural gas or propane, but it does not burn or combust the fuel as in an Internal Combustion Engine (ICE) or a TEG. The combustion process in an ICE or a TEG creates significant waste heat as well as several byproducts that contribute to air pollution. This electrochemical conversion allows the RP to be inherently more efficient than combustion generators so that it can deliver more useable energy from the same amount of fuel. The user benefit is significant fuel/cost savings (see chart below).

Whisper Quiet, Clean, Green & Tax Credit Eligible

Unlike loud, noxious engine generators, the RP's virtually silent fuel cell core enables the direct generation of DC power without emitting NOx and SOx pollutants. RP CO2 emissions are significantly lower than combustion based generators. By switching to an RP from a Thermoelectric Generator (TEG), a user can reduce carbon footprint by up to 50 tons/year or the equivalent of removing 10 cars from the road for a year. Fuel cell products like the RP are defined as renewable energy sources by the US government and are eligible for state and federal tax credits that can be \$3,000 per system or more.



High efficiency RP Power Systems achieve significant fuel savings compared to incumbent technologies.



The Acumentrics RP Series is a family of quiet, clean and reliable DC power systems based on proprietary tubular ceramic fuel cell technology to serve remote or off grid applications.

CLEAN
RELIABLE
POWER

Acumentrics



MODELS

RP500N-C48-ACDEHSW

System Options

- A = Auxiliary Output (~12VDC @ max of 100 watts)
- C = Cellular Network Communications
- D = Satellite Dish Communications
- E = E-Stop Button
- H = High Pressure Gas (Allows Max Fuel Inlet pressure up to 125psi)
- S = High Sulfur Content Gas
- W = High Water Content Gas (Recommended for hi water content in gas)

Nominal System Output Voltage

- 12 = 12 VDC
- 24 = 24 VDC
- 48 = 48 VDC

Operating/Control Mode

- C = Current Control Mode
- V = Voltage Control Mode
- B = Battery Charge Mode

Fuel

- N = Natural Gas (Methane)
- P = Propane (LP Vapor)

Max System DC Output Power

- 250 = 250 watts
- 500 = 500 watts

Base Model

RP250/RP500*

250/500W NATURAL GAS OR PROPANE FUELED REMOTE POWER SYSTEM

OUTPUT

Fuel Cell Capacity: 500W (RP500) or 250W (RP250)
Peak Power from Fuel Cell Bundle

Electrical Efficiency:

- > 30% @ 500W DC Output Power (RP500)
- > 25% @ 250W DC Output Power (RP250)

DC Output Power: 500W (RP500) or 250W (RP250)
Maximum Continuous

DC Output Voltage: User Adjustable, 2-58VDC (RP500),
10-35VDC (RP250)

DC Output Current: 100A Maximum Continuous
(RP500), 25A Maximum Continuous (RP250)

Note: Current will also be limited by maximum output power of 500W (RP500) or 250W (RP250)

Operating/Control Modes:

- Current Control Mode
- Voltage Control Mode
- Battery Charge Mode

Start-up Time to Max Output Power: <60 minutes

MECHANICAL

Nominal Envelope Dimensions (H x W x D):

22in x 22in x 39in (559mm x 559mm x 991mm)

Weight: 300lbs (136kg)

COMMUNICATIONS

Local control and monitoring of system status and performance data is standard and can be accessed through an Ethernet cable connection. As an option, the system can also be monitored and controlled remotely.

PREVENTIVE MAINTENANCE

- Air and fuel filters – Replace annually
- Desulfurizer canister – Replace as necessary
- Batteries, fans, valves, etc. – Inspect, clean or replace as necessary

WARRANTY

- Standard Warranty: 1 year
- An extended warranty is available as an option.

FUEL

RP500N or RP250N: Natural Gas

RP500P or RP250P: Propane (LP Vapor)

Fuel Supply Pressure:

- 2 to 5 psig for std system;
- 2 to 125 psig with High Pressure Gas (Option -H)

Maximum Sulfur Content:

<60ppmw (42mg/m3)

Maximum Water Content:

- <500ppmv for std system;
- Self draining coalescing filter available for High Water Content Gas (Option -W)

Fuel Consumption:

@ 500W DC Output Power:

- RP500N: 5.70 ft³/hr (0.16 m³/hr)
- RP500P: 0.06 gals/hr (0.24 liters/hr)

@ 250W DC Output Power:

- RP250N: 3.51 ft³/hr (0.10 m³/hr)
- RP250P: 0.04 gals/hr (0.14 liters/hr)

ENVIRONMENTAL

Operating Temperature:

-40°C to -50°C (-40°F to -122°F)

Storage Temperature:

-40°C to -55°C (-40°F to -131°F)

Humidity:

5% to 95% (non-condensing)

Operating Altitude:

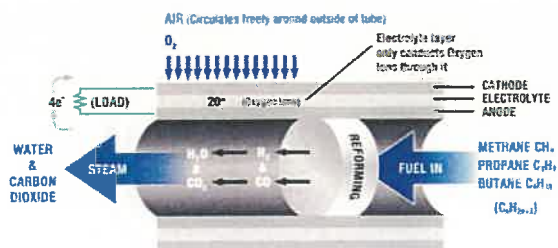
0 to 10,000 ft (3,048m)

Storage Altitude:

0 to 40,000 ft (12,192m)

SOLID OXIDE FUEL CELL

SOLID STATE (CERAMIC) CONSTRUCTION



Acumentrics' tubular SOFC technology enables clean, reliable power for your off grid applications.

CLEAN
RELIABLE
POWER

- Continuous Power for Remote or Off Grid Applications
- High Energy Efficiency Yields Significant Fuel Savings
- Available Fuel Options — Natural Gas & Propane

- Low Maintenance — Solid State Construction
- Safe, Quiet and Clean — Electrochemical Fuel Conversion Minimizes Emissions

DATA SHEET

Specifications & Performance

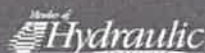
Certified Quality



Quality System
ISO 9001 Certified



Environmental Management System
ISO 14001 Certified



Certified to CSA Technical Letter No. R-14



Certified to ANSI LC6-2008



Warren Rupp, Inc.
A Unit of IDEX Corporation
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Mansfield, Ohio 44902 USA
Telephone 419.524.8388
Fax 419.522.7867
SANDPIPERPUMP.COM



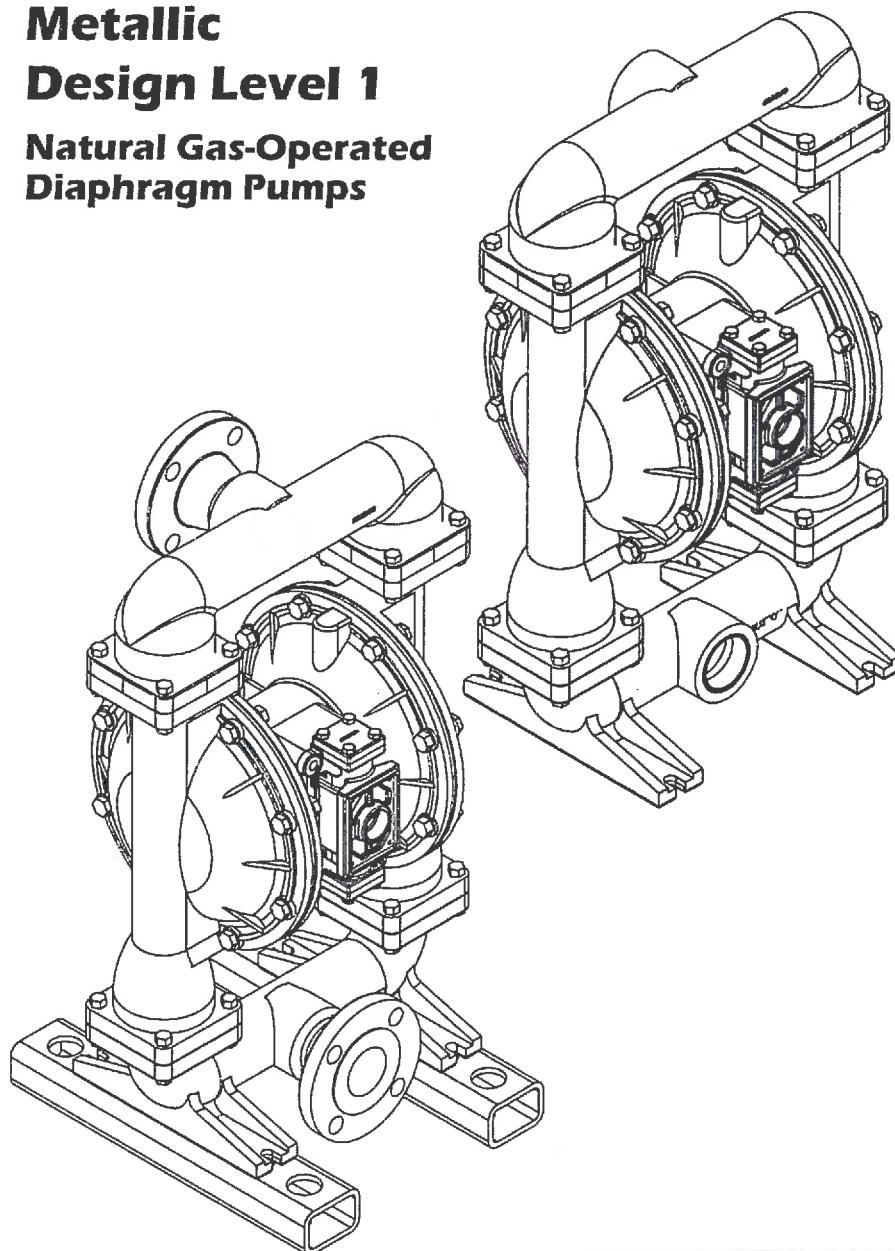
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Model G20

Metallic

Design Level 1

**Natural Gas-Operated
Diaphragm Pumps**



SANDPIPER®
A WARREN RUPP, INC. BRAND
SANDPIPERPUMP.COM

Explanation of Pump Nomenclature

Your Model #: **G**

the 1st 3 characters
of the model number

Pump Brand	Pump Size	Check Valve	Design Level	Wetted Material	Diaphragm/Check Valve	Check Valve Seat	Non-Wetted Material	Porting Options	Pump Style	Muffler Options	Pump Options
Model #: G	XX	X	X	X	X	X	X	X	X	X	XX

Pump Brand

G Gas Operated

Pump Size

20 2"

Check Valve Type

B Ball

Design Level

1 Design Level

Wetted Material

S Stainless Steel

A Aluminum

Diaphragm/Check Valve Materials

B Nitrile/Nitrile

V FKM / FKM

5 Nitrile/PTFE

Check Valve Seat

B Nitrile

T PTFE

A Aluminum

S Stainless Steel

Non-Wetted Material Options

A Painted Aluminum

B Unpainted Aluminum with Stainless Steel Gas Valve

D Unpainted Aluminum with Stainless Steel Gas Valve with FKM O-rings

X Unpainted Aluminum

0 Unpainted Aluminum/FKM Elastomers

V Unpainted Aluminum/FKM Elastomers

S Stainless Steel/ S02/304 SS Hardware

T Stainless Steel/ 316 Stainless Hardware

7 Painted Stainless Steel

8 Stainless Steel/FKM Elastomers

9 Painted Stainless Steel/FKM Elastomers

Porting Options

N NPT Threads

B BSP (Tapered) Threads

R 150# Raised Face 2" ANSI Flange w/ Threaded Pipe Connections

W 150# Welded Raised Face 2" ANSI Flanged Manifolds

Pump Style


S Standard

Muffler Options

X No Muffler Permitted *

Your Serial #: _____

ATEX Detail

	ATEX Rating	Wetted Material Options	Non-Wetted Material Options
	II 1G c T5 II 1D c T100°C I M1 c I M2 c	S	S, T, 7, 8, 9
	II 2G c T5 II 2D c T100°C	All Options	All Options

Performance

G20 METALLIC

SUCTION/DISCHARGE PORT SIZE

• 2"

CAPACITY

• 0 to 150 gallons per minute
(0 to 567 liters per minute)

GAS DISTRIBUTION VALVE

• No-lube, no-stall design

SOLIDS-HANDLING

• Up to .25 in. (6mm)

HEADS UP TO

• 100 psi or 231 ft. of water
(7 bar or 70 meters)

MAXIMUM OPERATING PRESSURE

• 100 psi (7 bar)

DISPLACEMENT/STROKE

• .42 Gallon / 1.59 liter

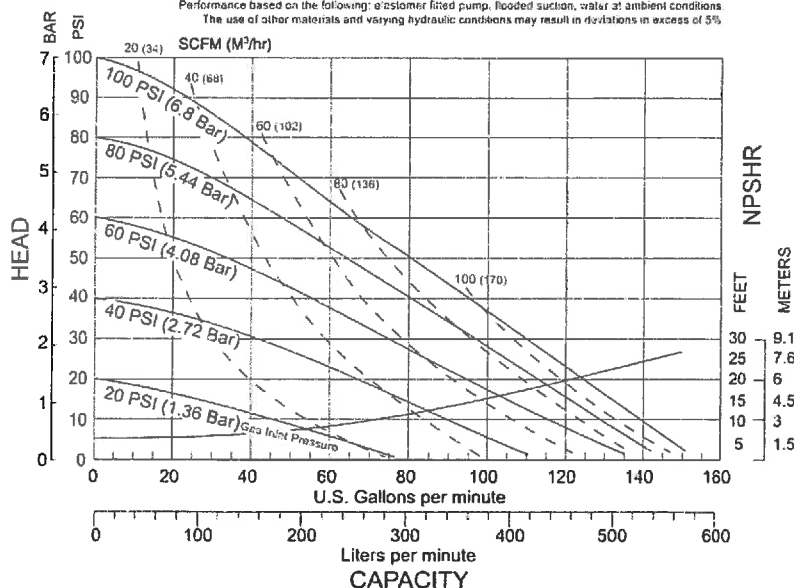
SHIPPING WEIGHT

• Aluminum 69 lbs. (31kg)
• Stainless Steel 114 lbs. (52kg)

These pump models are designed to pump the following fluids:
Crude Oil, Salt Water, Drilling Mud, Condensate, Lubrication Oils,
Glycol, Caustic Liquids, and Acids.*

MODEL G20 Metallic Performance Curve

Performance based on the following: customer fitted pump, flooded suction, water at ambient conditions.
The use of other materials and varying hydraulic conditions may result in deviations in excess of 5%.



Exhaust Gas: The exhausted natural gas must be vented to a low pressure safe location in accordance with local fire safety and environmental codes, or in the absence of local codes, an industry or nationally recognized code having jurisdiction over the specific installations, and/or CAN/CGA B149, Installation Codes

Materials

Material Profile:

CAUTION! Operating temperature limitations are as follows:

FKM: (Fluorocarbon) Shows good resistance to a wide range of oils and solvents; especially all aliphatic, aromatic and halogenated hydrocarbons, acids, animal and vegetable oils. Hot water or hot aqueous solutions (over 70°F (21°C)) will attack FKM.

Nitrile: General purpose, oil-resistant. Shows good solvent, oil, water and hydraulic fluid resistance. Should not be used with highly polar solvents like acetone and MEK, ozone, chlorinated hydrocarbons and nitro hydrocarbons.

Virgin PTFE: (PFA/TFE) Chemically inert, virtually impervious. Very few chemicals are known to chemically react with PTFE; molten alkali metals, turbulent liquid or gaseous fluorine and a few fluoro-chemicals such as chlorine trifluoride or oxygen difluoride which readily liberate free fluorine at elevated temperatures.

Maximum and Minimum Temperatures are the limits for which these materials can be operated. Temperatures coupled with pressure affect the longevity of diaphragm pump components. Maximum life should not be expected at the extreme limits of the temperature ranges.

Metals:

Stainless Steel: Equal to or exceeding ASTM specification A743 CF-8M for corrosion resistant iron chromium, iron chromium nickel and nickel based alloy castings for general applications. Commonly referred to as 316 Stainless Steel in the pump industry.

For specific applications, always consult the Chemical Resistance Chart

Ambient temperature range: -20°C to +40°C

Process temperature range: -20°C to +90°C for models rated as category 1 equipment
-20°C to +100°C for models rated as category 2 equipment

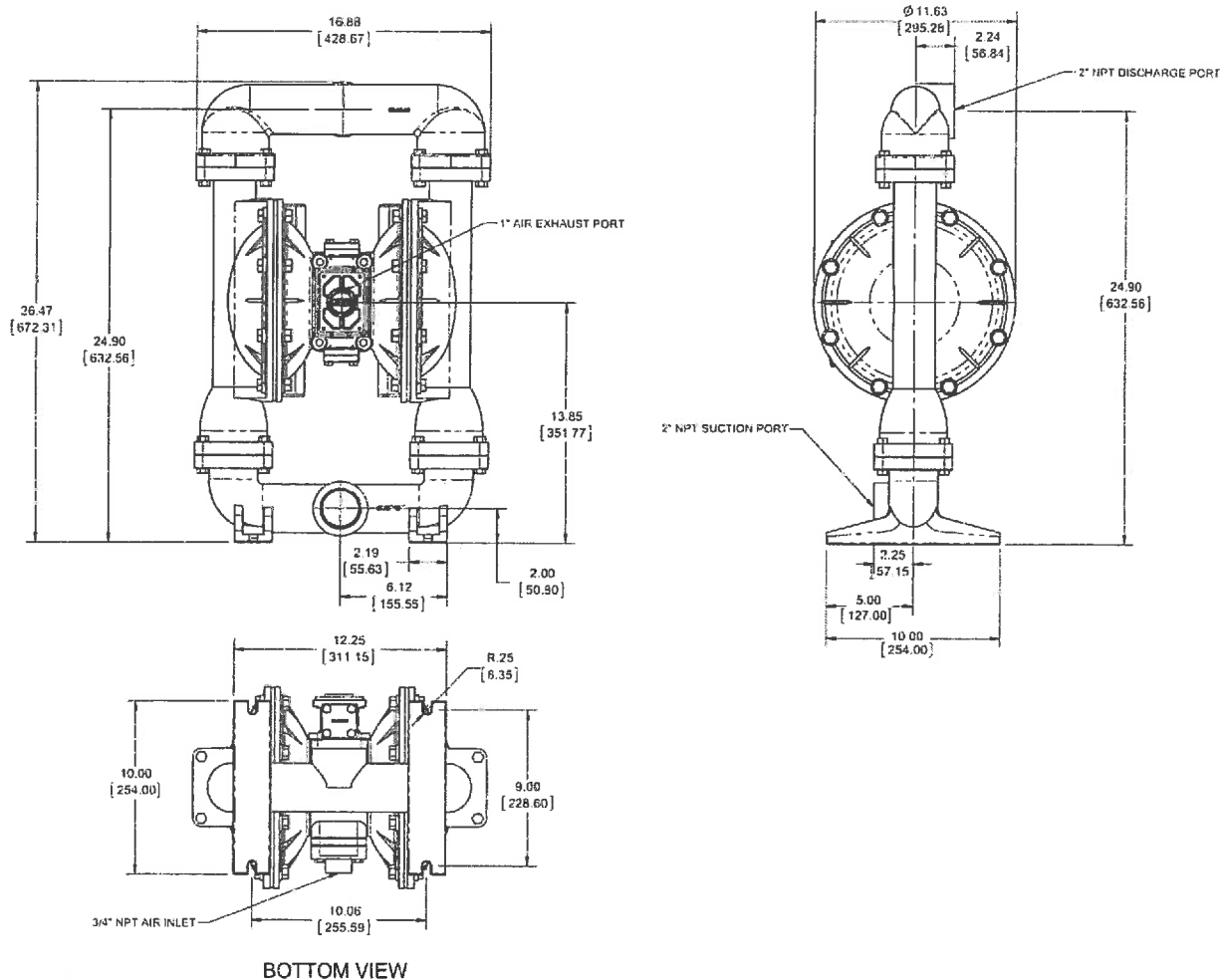
In addition, the ambient temperature range and the process temperature range do not exceed the operating temperature range of the applied non-metallic parts as listed in the manuals of the pumps

Dimensional Drawings

G20 Metallic

Dimensions in inches (mm dimensions in brackets). Dimensional Tolerance: $\pm 1/8"$ ($\pm 3\text{mm}$)

The dimensions on this drawing are for reference only. A certified drawing can be requested if physical dimensions are needed

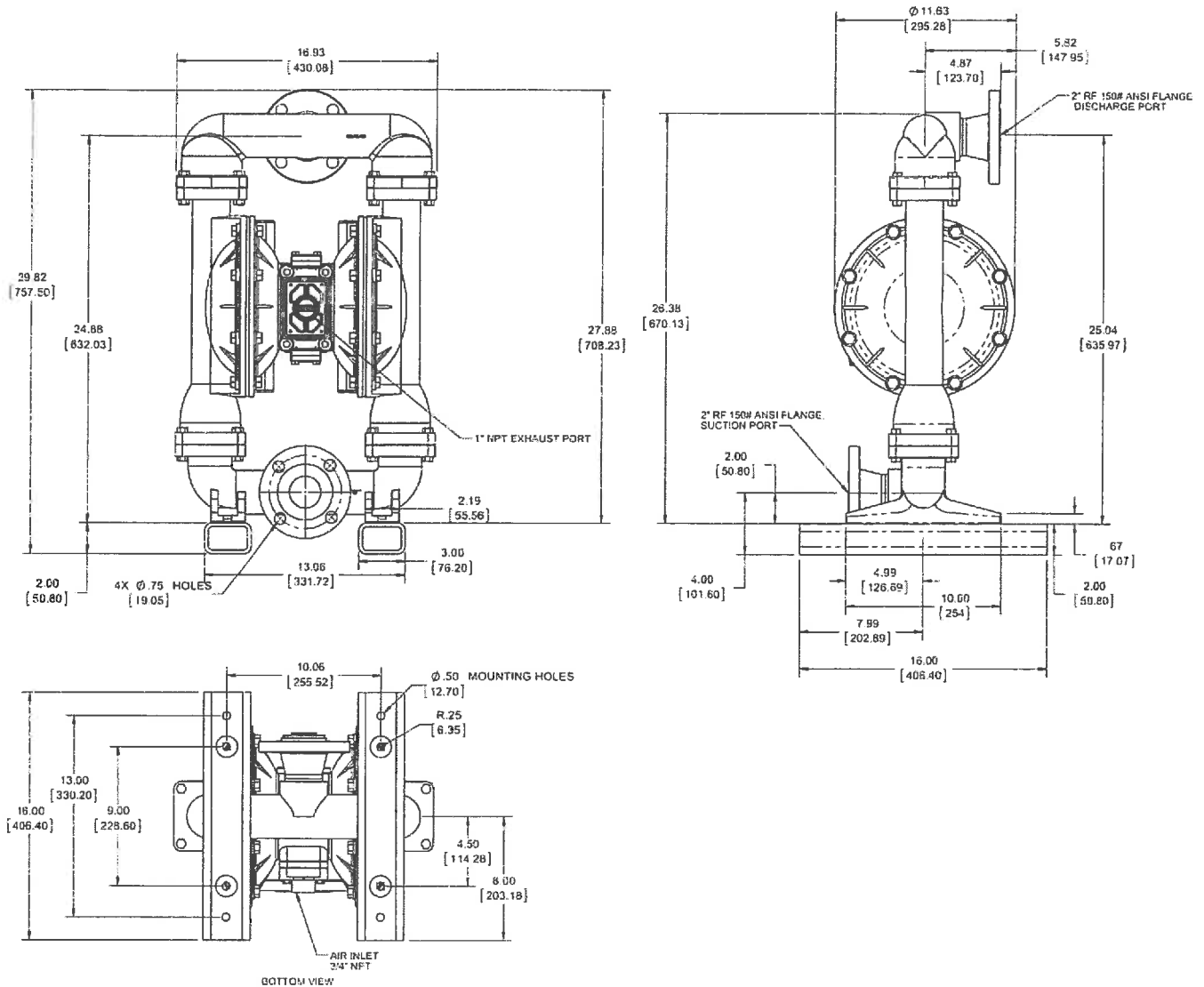


Dimensional Drawings

G20 Metallic - ANSI Flange

Dimensions in inches (mm dimensions in brackets). Dimensional Tolerance: $\pm 1/8"$ ($\pm 3\text{mm}$)

The dimensions on this drawing are for reference only. A certified drawing can be requested if physical dimensions are needed



5 - YEAR Limited Product Warranty

Warren Rupp, Inc. ("Warren Rupp") warrants to the original end-use purchaser that no product sold by Warren Rupp that bears a Warren Rupp brand shall fail under normal use and service due to a defect in material or workmanship within five years from the date of shipment from Warren Rupp's factory. Warren Rupp brands include Warren Rupp®, SANDPIPER®, MARATHON®, PortaPump®, SludgeMaster™ and Tranquilizer®.

~ See sandpiperpump.com/content/warranty-certifications for complete warranty, including terms and conditions, limitations and exclusions. ~

**WARREN
RUPP, INC.**

Declaration of Conformity

Manufacturer: Warren Rupp, Inc., 800 N. Main Street
Mansfield, Ohio, 44902 USA

Certifies that Air-Operated Double Diaphragm Pump Series: HDB, HDF, M Non-Metallic, S Non-Metallic, M Metallic, S Metallic, T Series, G Series, U Series, EH and SH High Pressure, RS Series, W Series, SMA and SPA Submersibles, and Tranquilizer® Surge Suppressors comply with the European Community Directive 2006/42/EC on Machinery, according to Annex VIII. This product has used Harmonized Standard EN809:1998+A1:2009, Pumps and Pump Units for Liquids - Common Safety Requirements, to verify conformance.

David Roseberry
Signature of authorized person

David Roseberry
Printed name of authorized person

October 20, 2005
Date of issue

Engineering Manager
Title

Revision Level: F

August 23, 2012
Date of revision

IMEX

CE

WARREN RUPP, INC.

EC / EU Declaration of Conformity

The objective of the declaration described is in conformity with the relevant Union harmonisation legislation: Directive 94/9/EC (until April 19, 2016) and Directive 2014/34/EU (from April 20, 2016).

Manufacturer:

Warren Rupp, Inc.
A Unit of IDEX Corporation
800 North Main Street
P.O. Box 1568
Mansfield, OH 44902 USA

Applicable Standard:

EN13463-1: 2001
EN13463-5: 2003
EN60079-25: 2004

Harmonised Standard:

EN13463-1: 2009
EN13463-5: 2011
EN60079-25:2010

The harmonised standards have been compared to the applicable standards used for certification purposes and no changes in the state of the art technical knowledge apply to the listed equipment.

AODD Pumps and Surge Suppressors

Technical File No.: 203104000-1410/MER

AODD (Air-Operated Double Diaphragm) Pumps

EC Type Examination Certificate No. Pumps: KEMA 09ATEX0071 X

DEKRA Certification B.V. (0344)

Meander 1051
6825 MJ Arnhem
The Netherlands

Hazardous Locations Applied:

I M1 c	II 1 G c T5
II 2 G Ex ia c IIC T5	II 1 D c T100°C
II 2 D Ex c iaD 20 IP67 T100°C	II 2 G c T5
II 2 G Eex m c IIT5	II 2 D c T100°C
II 2 D c IP65 T100°C	

SANDPIPER®
A WARREN RUPP, INC. BRAND

Tranquilizer®

DATE/APPROVAL/TITLE:
18 March 2016

David Roseberry
David Roseberry, Director of Engineering

IDEX

Noble Energy, Inc. SHL 22 Production Facility

ATTACHMENT P

Class I Legal Advertisement

AIR QUALITY PERMIT NOTICE
Notice of Application for Permit Application

Notice is given that Noble Energy, Inc. has applied to the West Virginia Department of Environmental Protection, Division of Air Quality, for a 45CSR13 Permit for its SHL 22 oil and natural gas production facility located in Marshall County West Virginia at latitude 39.99576622 and longitude -80.56099553. From Interstate 70, take Dallas Pike Road Exit (Exit 11), at bottom of ramp, make a right if traveling east or left if traveling west onto CR 41 (Dallas Pike Road), and travel Dallas Pike Road approximately 4.9 miles to the town of Dallas, make a right onto CR 7 (Stone Church/Sand Hill Road), make a right onto Stone Church/Sand Hill Road and travel approximately 1.8 miles to CR 7 (Wye Intersection) – Sand Hill Road, make a left hand turn onto Sand Hill Road and travel approximately 1.1 miles to CR 9 - Standiford Hill Road, make a right turn onto Standiford Hill Road and travel 0.1 mile to lease road on left.

The applicant estimates the potential to discharge the following Regulated Air Pollutants will be:

Regulated Pollutant	Potential Annual Emissions in tons per year (tpy)
Carbon Monoxide	30.67
Nitrogen Oxides	11.34
Particulate Matter (PM)	0.47
PM-10	0.47
Sulfur Dioxide	0.04
Total Volatile Organic Compounds	26.51
Total Hazardous Air Pollutants	2.44
Total Carbon Dioxide Equivalent	17,363

Startup of the operation is planned to begin on or about February 22, 2017. Written comments will be received by the West Virginia Department of Environmental Protection, Division of Air Quality, 601 57th Street, SE, Charleston, WV 25304, for at least 30 calendar days from the date of publication of this notice.

Any questions regarding this application for 45CSR13 Permit should be directed to the DAQ at (304) 926-0499, extension 1250, during normal business hours.

Dated this, Thursday, October 06, 2016

By: Noble Energy, Inc.
 RJ Moses
 Operations Manager
 Marcellus Business Unit
 1000 Noble Energy Drive
 Canonsburg, PA 15317